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THE

FARMERS' PRACTICAL ENCYCLOPEDIA:

CONTAINING A SYSTEMATIC AND PRACTICAL TREATISE ON EVERY SUBJECT PERTAINING TO FARM AND HOME LIFE IN AMERICA.

VOL. I. A–G.

Over One Thousand Illustrations.

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PREFACE.

FOR many years the necessity of a thorough and practical work on Agriculture, Horticulture, Gardening, Stock-raising, Rural Architecture, Domestic Economy, etc., has been felt by the farmers of America. While it is true that there have been many thousands of books written for the use of the farmer, yet they are only special treatises. Each work discusses only one or two features or departments of farm life, and many of them are of no practical value, as a greater portion of such literature is obsolete, a repetition of what everybody knows, or mere theory and speculation. What the farmer wants in this age of steam-engines, telegraphs and telephones, is a work comprising all knowledge pertaining to his sphere and profession, divested of all superfluous matter. He wants a work which will in the most direct manner supply knowledge as to the best methods in every emergency that can arise in the course of his work or farm life. Likewise, every housewife wants to know, with as little reading as possible, what are the simplest, best and cheapest methods of accomplishing all the ends of duty in her sphere. To fill this vacancy, to supply such knowledge in the most direct, authentic and accessible manner is the mission of the Farmers' Practical Encyclopedia. To render the work attractive and valuable to the young,—the boys and girls, the young ladies and gentlemen of the rural districts,—carefully prepared rules of life, of social intercourse and of popular instruction especially adapted to their sphere, have been incorporated

Years of practical experience, observation and general reading have been brought to bear in the compilation of this work. The valuable and practical facts and suggestions have been gleaned from all the agricultural literature of the present day. A library was collected for this purpose, containing the principal agricultural, live-stock and domestic publications of the day, many reports of the transactions of State societies, and all the best dissertational and systematic treatises on all the various subjects of importance and interest to the farmers. All of the compilation has been as thoroughly digested and as carefully composed as though it wholly consisted of original matter. Such articles as were thought to incur any risk of either error or deficiency of statement have been submitted to the revision of well-known practical men. Indeed, the work as a whole will be found remarkably adapted to the existing condition of farm life in the United States, and may be relied upon as authoritative upon every subject treated. To make it authentic in detail has been one of the chief points in view, only standard works and recognized authorities having been consulted in its compilation. Nor is it sectional in its character, or in the interest of any one but the farmer. His interest has ever been borne in mind.

The alphabetical arrangement of the work affords the utmost facility of consultation. To direct the reader to all the related parts of each subject references are made from article to article. The various sub-heads or divisions under any subject, such as diseases of cattle, horses, etc., are also treated alphabetically. Not the least important feature is the definition given of all technical words and terms pertaining to farm life. The correct pronunciation of all words which are apt to be mispronounced is also given. In short, the Farmers' Practical Encyclopedia will supply farmers and their households with all the information of every nature necessary to carry on their profession to the best advantage, and it places it before them in a manner of easy access and in a state of perfect readiness for use.

In the domestic treatment of the diseases most common to man we have not conformed to the theories or teachings of any particular school, nor have we attempted to substitute our own treatment in all cases, but have given such directions and prescribed such treatment as may be the quickest obtained and easiest administered, the safest to handle by the non-professional, and such as are recognized by many of the most eminent physicians as excellent remedies. Only the diseases of the human family are treated in their regular alphabetical place, the diseases of stock being treated alphabetically in the articles on the respective animals. In giving the causes and describing the symptoms of diseases, simplicity in style and diction, yet scientific exactness, has been our motto; and in prescribing treatment, those remedies which the ordinary farmer can without difficulty procure and administer are first given.

Few books of any nature have been more profusely illustrated, and with as high class of engravings as we have the pleasure of presenting in this volume. Special care has been taken to represent every animal in its most life-like form, and every implement or contrivance after the most improved pattern.

With a word as to the importance of such a volume and the necessity of the farmer seeking knowledge from every possible source, we will dedicate this Encyclopedia to the progressive farmers of America. Not an art which is practiced by man includes a greater variety of operations or involves a greater number of scientific principles than farming, and yet almost every other art is popularly regarded as far more intricate and technical, and as requiring a far higher qualification and a far more systematic and prolonged course of preparation for its successful operation. Popular opinion justly imposes a long apprenticeship upon every candidate to learn any of the trades, a long course of preparatory study upon every candidate for scientific or intellectual employment, and both an apprenticeship and a preparatory course of study to those who enter many of the professions; and yet, with marvelous inconsistency, it imposes no special study or apprenticeship upon the one who enters an employment far more noble and intricate than any trade, and combining the influences of at least two-thirds of all the physical sciences, with the most varied manipulations of every complex art. As a matter of fact, no tradesman or professional man, with one or two exceptions, requires more training or a larger amount of technical knowledge than a farmer. None possesses equal facilities to turn a liberal education to an excellent practical account.

This volume, as a work of reference and general instruction, will be found an ever-present help to the farmer of great or little knowledge. Everything has been made as plain as possible, as minute and detailed as necessary, as exhaustive, elaborate and varied as the broadest scope of the work would permit; and when intelligently and carefully consulted, we sincerely believe no farmer in America but will find it contains a vast mine of useful information.

CHAPMAN BROTHERS.

Chicago, Illinois.

AUTHORS AND WORKS CONSULTED AND QUOTED, AND CONTRIBUTORS.

BELOW we give a list of many of the authors and books that have been consulted and quoted in the compilation of these volumes, and also the names of those contributing directly. Besides these aids, and many more not mentioned, we have had the agricultural, horticultural and entomological reports of many of the States at hand and from which some of the freshest, most practical and valuable thoughts and suggestions have been obtained. In addition to these, we have also gleaned from the most ably edited papers and journals of this country and England that are published in the interests of the farmer. Thus, with all these helps in the hands of an able and efficient corps of writers and compilers, and with the thoroughly prepared articles contributed by well-known writers, the publishers feel that they can present these volumes to the farmers of the United States as a standard encyclopedia of their honorable calling.

Allen, Horace R., *Farm and Home Encyclopedia.*
Allen, Lewis, F., *American Cattle.*
  Rural Architecture.
  New American Farm Book.
American Encyclopedia.
American Standard of Excellence in Poultry.
Arnold, Prof. L. B., *Cheese Making*
Arnold, Richard, *Chronicles.*
Atwood, Prof. H. F.
Atwood, D. T., *Country and Suburban Houses.*
Audubon, John J., *Ornithology.*
Baker, R., *Dairy Cows.*
Barker, Geo. F., M. D., *Chemistry.*
Barn Plans and Out-Buildings.
Barry, P., *Fruit Garden.*
Bateham, M. B.
Beale, W. J., Prof. Botany in Mich. Agr'l Coll.
Bicknell's *School-House and Church Architecture.*
Blackstone's *Commentaries on English Law.*
Boulay, Monsieur, M. D.
Brodie, Sir Benjamin, M. D.
Brown, J. B., *Ensilage.*
Bruson, W. C., M. D., *Porcitis*; *Swine Husbandry.*
Bryant, Arthur, *Culture of Forest Trees.*
Budd, Prof. J. L., Iowa State Agr'l College.
Burrill, T. J., Prof. Horticulture and Entomology in Illinois State Industrial University.
Byrnes' *Ready Reckoner.*
Carpenter, Prof. R. C., Michigan State Agricultural College.
Case, L. D., *Florist.*
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Clark, Bracy, V. S.
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Columella, *Book of the Farm.*
  Gardening.
  Rural Affairs.
Cook, A. J., *Bee-keeper's Guide.*
Curtis, F. C.
Curtis, Col. F. D.
Cutter, Calvin, A. M., M. D., *Anatomy, Physiology and Hygiene.*
Cooley's *Cyclopedia of Practical Receipts.*
Dadd, Geo. H., V. S., *The Modern Horse Doctor.*
  The American Horse Book.
Daniells, Prof. W. W., University of Wisconsin.
Davy, Sir Humphrey.
Detmers, Dr. H. J., *Swine Plague, etc.*
Dick, Wm. B., *Encyclopedia of Practical Receipts.*
Dillon, E.
Downing, A. J., *Fruits and Fruit-Trees of America.*
  Rural Essays.
  Landscape Gardening.
Draper, J. W., M. D., *Chemistry.*
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Edwards, Samuel.
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Emery, H. D.
Encyclopedia Britannica.
Encyclopedia of Domestic Economy.
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Faraday, Michael, Electrician.
Felch, I. K., *Amateur's Poultry Manual.*
Fleming, George, V. S. R. E.
Flint, Austin, Jr., M. D., *Human Physiology.*
Flint, L., *Milch Cows and Dairy Farming.*
  Forage Grasses.
Food Adulteration.
Forbes, S. A., Director of Illinois State Labratory of Natural History.
Fuller, A. S. *Small-Fruit Culturist.*
  Grape Culturist.
Gamgee, Prof.
Glasspoole, H. G., *Common Cultivated Vegetables.*
Goodale's *Principles of Breeding Dom. Animals.*
Gray, Asa, *Botany.*
Greeley, Horace, *What I Know about Farming.*
Green, Seth, *Fish Culture.*
Gregg, Thomas, *Handbook of Fruit Culture.*
Gregory, James J. H., *Treatises on Cabbage, Onions, Squash, etc.*
Guenon, M., *Treatise on Milch Cows.*

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Hall's *Journal of Health.*
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Herbert, Henry William, ("Frank Forester"), *Hints to Horsekeepers.*
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Horn, A., V. S.
Humboldt, Alexander von.
Ingersoll, Prof. C. L., Mich. State Agr. College.
Jackson, Gen. W. H.
Jacques, D. H., *The House.*
Hints Toward Physical Perfection.
Jennings, Robert, V. S., *Cattle and their Diseases.*
Sheep, Swine and Poultry.
The Horse and His Diseases.
Johnson, L. W. B.
Johnston, *Analysis of Soils, Manure, etc.*
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Le Duc, U. S. Com'r of Agriculture.
Leland, E. H., *Farm Homes.*
Long, Joseph W., *American Wild-Fowl Shooting.*
Lord, Prof. Nat. W., *Analyses of Fertilizers.*
Loring, Geo. B., U. S. Com'r of Agriculture.
Loudon's *Cyclopedia of Agriculture.*
Low, Prof. David, *Domestic Animals.*
Manning, J. R., M. D., V. S., *Stock Doctor and Live-Stock Encyclopedia.*
Mayhew, Edward, *Illustrated Horse Doctor.*
Illustrated Horse Management.
McClure, Robert, M. D., V. S, *Diseases of the American Horse, and Cattle and Sheep.*
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McWhorter, Tyler, Horticulturist.
Merrill, Maj. H. W., U. S. A.
Miles, Manly, A. M , V. S.
Miles, William, *Horse's Foot.*
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Philadelphia Academy of Sciences, *Reports.*
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Rarey, John S. Horse Trainer.
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Reed, S. B., *House Plans for Everybody.*
Rhodes, Miss Kate, *Culture on the Farm, Intellectual, Social and Esthetic.*
Riley, Charles V., M. A., Ph. D., Chief of U. S. Entomological Commission.
Roe, Rev. E. P., *Culture of Small Fruits*
Play and Profit in My Garden.
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Sanders, J. H., *Percheron-Norman Stud Book.*
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Turer, Prof. J. B., Ill. College, Jacksonville, Ill.
United States Dispensatory.
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Vennor, Henry G., F. G. S., Meteorologist.
Vick, James, Florist.
Virgil, Bucolics and Georgics.
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Every Horse-Owner's Encyclopedia.
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Architecture and Rural Art.
Wright, L., *Practical Poultry Keeper.*
Youatt, William, V. S. *The Horse. The Sheep. The Dog. Cattle.*

THE FARMERS' PRACTICAL ENCYCLOPEDIA.

A Practical Manual in all Departments of Rural Life.

ACCIDENTS and Emergencies. In all cases of Burns, Scalds, Wounds, Bites, Poisoning, Drowning, Smothering, etc., see under these respective heads, and in all dangerous cases send at once for a physician. In the following condensed paragraphs may be found instructions for miscellaneous accidents, and cases of emergency. These are simple, and if observed will avoid much suffering, and often save life.

For dust in the eyes, avoid rubbing; dash water into them; remove cinders, etc., with the round point of a lead pencil.

Remove insects from the ear by tepid water; never put a hard instrument into the ear.

If an artery is cut, compress above the wound; if a vein is cut, compress below.

If choked, get upon all fours, and cough.

For light burns, dip the part in cold water, or cover with saleratus or cooking soda. If the skin is destroyed, cover with varnish.

Smother fire with carpets, etc.; water will often spread burning oil, and increase danger. Before passing through smoke, take a full breath, and then stoop low; but if carbon is suspected, walk erect.

Suck poison wounds, unless your mouth is sore. Enlarge the wound, or, better, cut out the part without delay. Hold the wounded part as long as can be borne to a hot coal, or end of a cigar.

In case of poisoning, excite vomiting by tickling the throat, or by water and mustard. For acid poisons give akalies; white of egg is good in most cases. In cases of opium poisoning, give strong coffee, and keep moving. If taken with cramps in in water, float on the back.

For apoplexy, raise the head and body; for fainting, lay the person flat.

If a child lay hold of a knife or razor, do not try to pull it away, or to force open the hand; but, holding the child's hand that is empty, offer to its other hand anything nice or pretty, and it will immediately open the hand and let the dangerous instrument fall.

When in a carriage during a runaway, it is safer, as a general rule, to keep your place than to jump out. Getting out of a gig over the back, provided you can hold on a moment and run, is safer than springing from the side. But it is best to keep your place and hold fast. In accidents, people act not so much from reason as from excitement; but good rules, firmly impressed upon the mind, generally rise uppermost, even in the midst of fear.

Accounts, in farming and household affairs: see Book-keeping.

Acetate of Lead. Antidote for Poisoning by: After a thorough emetic, give a solution of soda in water; or milk, white of egg and water. Send for a physician.

Acetic Acid, the acid principle of vinegar. The easiest way to separate it from the water in vinegar is to freeze the liquid; the water becomes ice, while the acid remains fluid. This acid is a caustic, and may be applied to the skin as a blister, like Spanish flies. It is also a good corrosive of warts and corns, and is used in various medicinal and other preparations. It will preserve meat almost as well as salt, but leaves it much more insipid. A person poisoned by swallowing this substance will have an intense burning pain in the mouth, throat and stomach, will vomit blood, have violent purging, collapse and stupor. Give chalk, magnesia, lime, or even soap, in large quantities of water, producing an emetic. Then give milk, or white of egg, mixed with water.

Acids. Hydrochloric, or spirit of salt; nitric, or aqua fortis; sulphuric, or oil of vitriol. Poisoning by any of these produces an acid, burning taste, acute pain in the gullet and throat, vomiting of bloody fluid, which effervesces when chalk is added to it; hiccough, tenderness of the belly, cold sweats, pinched face, convulsions and death. Give *calcined* magnesia, chalk, soap and water. Administer frequent draughts of water to weaken the acid; the carbonate of soda, potash, or magnesia, to neutralize it; thick soap-suds, made with common soap; chalk; or in default of the alkalies and chalk, break down the plaster of the wall or ceiling, mix in water, and give the sufferer. Excite vomiting, and repeat the remedies till all the acid is neutralized. For poisoning by mineral acids, or acetic and oxalic acids, give quickly large draughts of chalk, whiting, magnesia, soap and water, about as thick as cream, followed by albuminous diluents, such as milk, and white of egg mixed with water. Or, if these cannot be procured at once, warm water; and promote vomiting by tickling the throat.

Aconite, as a poison, produces acrid, biting, bitter taste, choking sensation, dryness of the throat, retching, vomiting, purging, pains in the stomach and bowels, difficult breathing. Give emetics of chamomile, mustard, or sulphate of zinc, large draughts of warm milk, or other bland fluids; foment the region of the stomach, and give strong coffee.

Acorns. Some of the sweeter acorns, as white-oak, burr-oak, and a few others, are good for food. They are, however, somewhat too astringent for extended use. Besides the raw state, they are prepared in four different ways; as, roasted, boiled, ground, and made into mush or bread. For the two latter purposes they are first roasted. They are first-class food for swine.

Acre, 160 square rods, which is equal to 4,840 square yards, or 43,560 square feet. A strip of ground one rod wide must be 160 rods, or half a mile, long, to be an acre; two rods wide, it must be one-fourth of a mile long to be equal to an acre; five rods wide, 32 rods long; 10 rods wide, 16 rods long. A square acre would be about 12⅔ rods on a side. There are 640 acres in a square mile, and 23,040 in a full congressional township of six miles square. A square chain being four rods square, or 16 square rods, there are 10 square chains to the acre; 160 acres constitute a "quarter" of a section, and if square, is one-half mile each way. A "lot" is 80 acres, or one-eighth of a section.

NUMBER OF PLANTS TO THE ACRE.

DIST. APART.	NO. PLANTS.	DIST. APART.	NO. PLANTS.
1 ft. by 1 ft.	43,560	7 ft. by 7 ft.	888
1½ " 1 "	19,360	8 " 8	680
2 " 1 "	21,780	9 " 9	537
2 " 2 "	10,890	10 " 10	435
2½ " 2 "	6,969	11 " 11	360
3 " 1 "	14,520	12 " 12	302
3 " 2 "	7,260	13 " 13	257
3 " 3 "	4,840	14 " 14	222
3½ " 3 "	3,555	15 " 15	193
4 " 1 "	10,890	16 " 16	170
4 " 2 "	5,445	17 " 17	150
4 " 3 "	3,630	18 " 18	134
4 " 4 "	2,722	19 " 19	120
4½ " 4 "	2,151	20 " 20	108
5 " 1 "	9,712	25 " 25	69
5 " 2 "	4,356	30 " 30	48
5 " 3 "	2,904	40 " 40	27
5 " 4 "	2,179	50 " 50	17
5 " 5 "	1,742	60 " 60	12
5½ " 5 "	1,417	66 " 66	10
6 " 6 "	1,210		

For intermediate numbers in the above table one can readily make the required calculation.

AMOUNT OF SEED TO THE ACRE. The following gives the quantity of seed and number of plants requisite to crop an acre of land, and will prove valuable to farmers and gardeners, and to families generally who may have only a small garden. It can always be referred to to set one right in any matter of doubt connected with the subjects involved:

Asparagus, in 12-inch drills, 16 quarts.
Asparagus, plants, 4 by 1½ feet, 8,000.
Barley, 2½ bushels.
Beans, bush, in drills 2½ feet, 1½ bushels.
Beans, pole, Lima, 4 by 4 feet, 20 quarts.
Beans, Carolina, prolific, etc., 4 by 3, 10 quarts.
Beets and mangolds, drills, 2½ feet, 9 pounds.
Broom-corn in drills, 12 pounds.
Cabbage, outside, for transplanting, 12 ounces.
Cabbage sown in frames, 4 ounces.
Carrot in drills, 2½ feet, 4 pounds.
Celery, seed, 8 ounces.
Celery, plant, 4 by ½ feet, 25,000.
Clover, white Dutch, 13 pounds.
Clover, lucern, 10 pounds.
Clover, Alsike, 6 pounds.
Clover, large red, with timothy, 12 pounds.
Clover, large red, without timothy, 16 pounds.
Corn, sugar, 10 quarts.
Corn, field, 8 quarts.
Corn salad, drill 10 inches, 25 lbs.
Cucumber, in hills, 3 quarts.
Cucumber, in drills, 4 quarts.
Egg plant, plants 3 by 2 feet, 4 ounces.
Endive, in drills, 2½ feet, 3 pounds.
Flax, broadcast, 20 quarts.
Grass, timothy with clover, 6 quarts.
Grass, timothy without clover, 10 quarts.
Grass, orchard, 25 quarts.
Grass, red top or herd's, 20 quarts.
Grass, blue, 28 quarts.
Grass, rye, 20 quarts.
Grass, millet, 32 quarts.
Hemp, broadcast, ½ bushel.
Kale, German greens, 3 pounds.
Lettuce, in rows, 2½ feet, 3 pounds.
Leek, 4 pounds.
Lawn grass, 35 pounds.
Melons, water, in hills 8 by 8 feet, 3 pounds.
Melons, citrons, in hills 4 by 4 feet, 2 pounds.
Oats, 2 bushels.
Okra, in drills, 2½ by ¼ feet, 20 pounds.
Onion, in beds for sets, 50 pounds.
Onion, in rows for large bulbs, 7 pounds.
Parsnip, in drills 2½ feet, 5 pounds.
Pepper, plants, 2½ by 1 foot, 17,500.
Pumpkin, in hills 8 by 8 feet, 2 quarts.
Parsley, in drills 2 feet, 4 pounds.
Peas, in drills, short varieties, 2 bushels.
Peas, in drills, tall varieties, 1 to 1½ bushels.
Peas, broadcast, 3 bushels.
Potatoes, 8 bushels.
Radish, in drills 2 feet, 10 pounds.
Rye, broadcast, 1¾ bushels.
Rye, drilled, 1½ bushels.
Salsify, in drills 2½ feet, 10 pounds.
Spinach, broadcast, 30 pounds.
Squash, bush, in hills, 4 by 4 feet, 3 pounds.
Squash, running, 8 by 8 feet, 2 pounds.
Sorghum, 4 quarts.
Turnips, in drills 2 feet, 3 pounds.
Turnips, broadcast, 3 pounds.
Tomatoes, in frames, 3 ounces.
Tomatoes, seed, in hills 3 by 3 feet, 8 ounces.
Tomatoes, plants, 3,800.
Wheat, in drills, 1¼ bushels.
Wheat, broadcast, 2 bushels.

Adornment, of Home: see Home Adornment, Lawn, Landscape Gardening, and Residence.

Adulteration, of Foods, etc.: see the respective articles. Agitation is now started for more stringent legislation, both local and national, to prevent adulteration of foods, condiments, and other articles of domestic use. We take this opportunity to encourage this agitation, until the unprincipled practice of running the great Juggernaut of the almighty dollar over the health and lives of innocent people is utterly ended.

Aftermath or **Rowen**. The second and third crops of grass in the same season: generally devoted to pasturage.

Agriculture: see Farming.

Ague. The symptoms are weakness, languor, and an uncontrollable disposition to gape and stretch; the patient is seized with a severe chill; he begins to shake all over, the teeth chatter, and the face and hands become pale. After the chill has passed, a warm sense of feeling returns, and gradually the whole system becomes flushed with heat. The patient grows thirsty, the head begins to ache, and a profuse sweat breaks out. It is not generally a dangerous disease, though very distressing and weakening. Persons subject to it should wear flannel next to the skin, and avoid exposure to damp air or by wet feet. Treatment—Reg.: One to four grains of quinine, once or twice a day; hot herb teas. Hom.: One grain of aconite every two hours; or six globules of ipecacuanha or nux vomica in a tumblerful of water, of which take a tablespoonful every two hours. Ecl.: Three times a day take two pills (usual size) of quinine and extract of flowering dogwood, in equal parts; after the paroxysms cease, take twice a day, for three days, a pill of extract of blood-root and waahoo in equal parts. For the biliousness give a cathartic of extract of dogbane, two parts, and one of podophyllin (a precipitated extract of May-apple root). Hyg.: Hot pack at the commencement of the cold stage, sponging off during the hot stage, continued rest, diet mainly on fruits, abstaining from condiments. It is said that a positive cure for chills and fever is to drink the juice of one lemon during the dry and thirsty stage, and to rub the whole body with the juice of another lemon.

Air, in health and disease: see Hygiene.

Alabaster ornaments are generally made of a kind of translucent gypsum. They are easily stained or colored with metallic solutions, tinctures, and colored oils; polished with finely powdered pumice stone or dried scouring-rush, and afterward with a paste formed of finely powdered and sifted slacked lime and water, and finally with French chalk. Grease spots may also be removed from such articles by rubbing with French chalk, or talc. A general cleaning may be effected with soap and hot water: if very dirty and stained, the piece should be first washed with dilute nitric acid.

Alcarraza is a porous vessel of earthenware for cooling water. Supplying its own surface with the water from within, it saves the trouble of keeping a wet linen or cotton cloth around it. A similar article, called "olla," is used in some parts of the South.

Alcohol, a semi-poisonous chemical made from the starch of grains, colorless, volatile and inflammable. It is extensively used in the arts, especially pharmacy, as it dissolves resin, essential oils, camphor, soap, sugar, wax, the gums and the alkaloids, most of which substances are imperfectly soluble in water. It curdles milk and albumen, separates starch and gum from their mucilages, and conserves all organic substances. It cannot be frozen. Hence its great utility; but, as with any other luxury, mankind could get along without it. "Proof spirit" contains $52\frac{1}{2}$ per cent. of alcohol in volume, the rest being water. This is the strength usually employed in medicines and perfumery. "Dilute alcohol" has $53\frac{2}{3}$ per cent. water, by volume.

To purify alcohol, filter it through alternate layers of sand, wood charcoal, boiled wheat and broken oyster shells. The fusel oil, which may be detected by mixing with an equal quantity of pure sulphuric acid, discoloring the liquid, can be easily extracted from small quantities of alcohol by adding a few drops of olive oil, shaking well, and decanting, after settling.

Alden Process of drying fruits and vegetables: see Drying.

Ale, a beverage made from an infusion of malt by fermentation. Having a smaller proportion of hops than beer, it is sweeter, and of a lighter color. Burton ale is the strongest, containing eight per cent. of alcohol; brown stout contains six per cent., and common beer only one per cent. As a beverage, ale is more popular in Great Britain than elsewhere, the people there considering it the most healthful of all drinks. In the United States, the Germans, being more numerous than any other class of foreigners, have well nigh supplanted other intoxicating drinks with their lager beer, except among the Irish and the more old-fashioned people.

To mull ale, take a pint of it, good and strong, put it into a sauce-pan with three cloves and a little nutmeg, and sugar to the taste; set it over the fire until it boils; then mix with it the beaten yolks of four eggs, which must be first mixed with a little cold ale.

Wassail, or lamb's-wool, is ale heated, sweetened and spiced. Very nice with hot toast, roasted apples, etc.

For brewing ale, adulteration, etc., see Beer.

Alfalfa, a forage plant akin to clover; Lucern, which see.

Allspice, or Jamaica pepper, takes its first name from the idea that it has the properties of all spices, particularly cinnamon, cloves and nutmeg. In purchasing, never buy ground or pulverized spice, as all such is adulterated with saw dust, ground peas, grains and even the dirt and dust of the mills.

Almonds (am′undz), nuts which are naturally akin to peachstones, but having softer shells. Sweet almonds are among the best nuts, and are used in fancy cookery; bitter almonds are poison. They cannot be profitably raised in the Northern United States. The "earth almond," recommended by a few parties as a farm product, is decidedly unprofitable anywhere in the North.

Aloe (al′o), a medicinal plant of tropical countries. The hot, bitter, purgative drug called "aloes" (al′oze), is the dried juice or extract of this plant.

Alpaca (al-pac′a), a camel-like animal of South America, about the size of a sheep, and furnishing a valuable wool. Attempts have been made to introduce it into this country, which may yet prove successful in certain mountainous regions. The word "alpaca" also denotes the cloth made from the wool, or hair, of the animal. To wash alpaca, see Laundry.

Alsike (al-se′ka) **Clover**: see Clover.

Alterative (ol′tera-tiv), a medicine which insensibly and gradually alters certain conditions and functional actions. Used in chronic cases. The term is also used adjectively.

Alum, the sulphate of alumina (an earthy mineral constituting the body of clay) and potash. It is astringent, and is good to stop bleeding. When burned, the powder becomes a good caustic. The astringent lotion is made by dissolving 6 to 8 drachms of alum in a quart of water. The various uses of this valuable substance are given under the respective heads in this volume.

Amalgam, a compound of quicksilver with another metal. An amalgam with lead, tin, and bismuth, is the coating on the back side of looking-glasses, and is poison. Costly mirrors are generally coated with pure silver. It is not advisable to re-coat old mirrors of the cheaper class.

Ammonia, or **Heartshorn**, is a volatile alkali, superior to soap for many domestic purposes, and is the old-time "smelling salts," so often resorted to in nervous affections, spasms, etc. When too much is swallowed, by mistake, there is a burning, biting taste, heat in the throat and stomach, vomiting of bloody matter, etc. As antidotes, give vinegar, and then oil of almost any kind, as sweet or linseed.

Anæsthetic (an-es-thet′-ic), destroying sensibility. Also the drug which has such an effect, as chloroform, ether, or any drug vapor inhaled to take away sensibility. Sometimes one is preferable, sometimes another, according to circumstances, but in general, chloroform is the most dangerous of all, while it is the most effectual. For short operations in surgery, violent breathing for a few seconds is sufficient to enable the patient to stand the operation.

Anbury (an′bu-ry), or **Ambury**, a soft tumor on horses and cows, containing blood; also, a swelling produced by insects on the roots of turnips, cabbages, etc.

Anchor. To "anchor" a building is to fasten it in an upright position by any special contrivance so strongly that it can withstand violent winds.

Anchovy (an-cho′vy), a small fish about three inches long, of the herring family.

Anchovy-pear, a plant and its fruit, found in the West Indies.

Andiron, a dog-iron, or fire-dog; a simple iron stand or frame for supporting wood in a fire-place.

Aneurism (an′u-rizm), a pulsating tumor situated in a section of an artery. The inner coat of the artery is ruptured, or gives away to the pressure of blood, and a dilation is thereby caused. When an aneurism has once commenced, it continues to enlarge until it attains a great size; often it bursts. No home treatment can be recommended, except fomentations to alleviate the pain.

Angelica, an aromatic herb sometimes cultivated as a salad or for medicine. The leaf-stalks are pealed and eaten raw, or are boiled with fish or other meat. The root, leaves and seeds are sometimes used medicinally as a tonic. It is sown and cultivated like carrots or parsnips. The root should be dug up in the autumn of the first year and dried.

Angling: see Fishing.

Aniline (an′i-lin), a base similar to ammonia, distilled from indigo and other plants, coloring a strong violet blue, with chloride of lime. One of the most valuable ingredients in Dyeing, which see.

Animal Charcoal: see Charcoal.

Animals, Treatment of Young. With regard to the foal or other creature which may be born in the fœtal membranes, it is evident that it must be freed from them immediately, or it will perish from suffocation; as, through having no longer any communication with the mother by means of the umbilical cord, the blood cannot be oxygenated. If the umbilical cord is not ruptured, it may be double ligatured about two inches from the umbilicus, and then divided between the ligatures; or it may be severed by scraping it through with a jagged knife. Immediately after delivery, and having removed the mucus which sometimes clogs the mouth and nostrils, and hinders respiration, the young animal should be examined to ascertain whether it be strong or weak, whether all the natural apertures exist—such as the eyes, mouth, anus, vulva, urethra—and if any of them chance to be absent, to make artificial ones soon, if possible, by a kind of puncture, enlarging afterward by the knife and sound, and preventing union by pledgets of lint, etc. Whenever the connection with the mother is interrupted by rupture or occlusion of the umbilical cord, the young creature must breathe, respiration being now carried on by the lungs, through the nostrils. It sometimes happens that the young creature is in a state of syncope when born, or very soon after, and gives no sign of life; and observers have distinguished syncope from weakness—in which the animal is cold and does not breathe, the mucous membranes being pale and the body flaccid—and syncope from plethora or the blue disease, when the mucous membranes are of a livid blue tint, the lips and tongue swollen, and the eyes injected. In the first form, resuscitation is to be attempted by pouring cold water on the head, beating the body with a cloth dipped in cold water—particularly about the face and chest—dry-rubbing the limbs, titillating the nostrils with a feather, puffing tobacco-smoke into them, imitating the respiratory movements, as in a case of asphyxia, and inflating the lungs by means of a pair of bellows, acting through the nostrils. So long as the heart pulsates there is a probability of restoration to life. In the second form, allowing a little blood to flow from the umbilical cord, and even cutting this, or fomenting it with hot water to induce hemorrhage, is very useful, in conjunction with cold water to the head and cold-water enemas. But, as a rule, death is always imminent in these cases of syncope. It is not rare to find newly-born animals, particularly when parturition has been laborious, injured more or less from the manipulation of the obstetrician during birth, the lesions being more or less serious. The most frequent injuries are those due to obstetrical instruments and appliances. The wounds may be dressed with cold water, with slightly alcoholized water, or some dilute tincture—such as that of arnica—but salts of lead, or other poisonous salts, should not be employed. Abrasions, which are generally superficial, may be treated with glycerine and water, to which a very little carbolic acid has been added, or by lard, or any mucilaginous substance. Sprains should have cold-water irrigation, if possible, refrigerant lotions, or friction with soap liniment. Wounds and lacerations, if very severe, must have appropriate surgical treatment.

With the larger animals, the newly born creature should be placed before the mother, if it is not near her; and it generally follows that she instinctively licks off the viscid matter which covers its skin; and in doing this the cutaneous circulation is excited, and, by sympathy, the other organs of the young animal. Consequently, it becomes revived, soon endeavors to get up, and though it may fall several times, yet it generally quickly succeeds in maintaining itself on its limbs, and instinctively seeks the maternal teat. It is very rare that the mother does not voluntarily, and at once, commence to cleanse her progeny; nevertheless, there are exceptions, chiefly among the primiparæ, and especially when the labor has been long and painful. But it will generally be found that sprinkling the young animal with a little flour, bran, or salt will excite the attention of the mother and induce the cleaning process. Should it not do so, then the creature must be well dried and rubbed with a sponge, hay-wisp, or a cloth, and kept warm. This is more particularly necessary when the mother is indifferent to it, which sometimes happens with primiparæ when people are present. Indeed, some mares become quite savage after parturition, and will not allow their foal to come near them, and will even kill it; though this most frequently happens when they are tormented by spectators. Other mares, vicious before parturition, sometimes become remarkably quiet when they have a foal by their side. When they exhibit any aversion to their progeny, it is well to leave them quietly together for some time.

If the foal or calf is weak, and cannot reach the teat within half an hour or so after birth (for in uniparous animals the mammæ are inguinal, so that the young are always suckled in a standing posture), it will be found necessary to assist it by bringing it to the mother, and applying the teat to its mouth, at the same time caressing and soothing the parent if disinclined to it by temper or painfulness of the udder. This coaxing and handling should be performed by some one accustomed to the animal. It may be necessary to have a second person at hand to hold the mare by the head or lift up her fore foot.

Sometimes, from weakness or inexperience of the foal, and temper of the mare, the former runs the risk of perishing from starvation. The mare should be safely secured, and two persons ought then to push and support the young animal behind, by joining one of their hands, while the other hands are employed in directing it toward the teat, which it should be allowed to use for two or three minutes. After one or two attempts of this kind, the foal begins to find its way to the udder by itself, while the mare becomes reconciled to it. When the foal exhibits great debility, it may be preferable to feed it for a day or two with the milk of the mare which has been drawn by hand.

With the cow these difficulties are seldom present; and if an animal will not take to its calf, this is generally transferred to another cow, or it may be artificially reared. The foal may even be reared in this manner, though not so easily as the calf. The milk of the cow or goat will suffice; and there is generally little difficulty in teaching it to drink it, by at first pouring a little into its mouth while the finger is inserted therein; or a piece of cloth steeped in milk, or even a bottle and tube may be used.

Calves are often harshly treated after birth; they are not allowed to suck, even for a number of days, for fear of damaging the cow, but are kept apart and fed on drawn milk. Calves intended for slaughter may be artificially fed, and especially if nutritive substances are added to the milk; but for those intended to be reared, it is a mistake to separate them from the cow during the early days of their existence.

Lambs, when able to stand, if they do not readily find their way to the teat, should have a little milk from it pressed into their mouths. With twin lambs, if the ewe is in good condition, the udder well filled, and the weather and pasture favorable, both may be suckled; in the opposite conditions, it may be necessary to remove one. If the ewe does not yield sufficient milk, this may be largely supplied by giving a liberal portion of good food.

Multiparous animals, such as the bitch and sow, usually lie when suckling their young, so that there is seldom any difficulty with them. The only care generally required in the case of young pigs is to prevent their being crushed by the sow in the act of lying down or moving. If the litter is large, plenty of good food is necessary. If a sow has more young in the litter than teats, unless watched, the weakest will die of starvation. Each young pig has its own particular teat, to which it is persistently attached; and if the creature is ill and does not suck, or if there is not a claimant for the teat, the gland there will cease secreting milk. The pectoral teats and glands are the largest and most active, and the weakest of the litter should be put to them. In general, a sow should not be allowed to rear more than ten in a litter. Cleanliness and warmth are required for young pigs.

Puppies do not require any special care beyond a warm, clean and dry abode.

After the first milk has been taken, there is usually an abundant evacuation of black, resinous matter — meconium — from the intestines of the young animal, caused by the "colostrum," as this milk is named; and it is well to notice if this evacuation occurs, as when it does not serious constipation may ensue. With new-born animals which, for some reason or another, are deprived of this colostrum, a mild laxative—such as castor oil, or honey and water—should be administered, to obviate this condition.

At birth the feet of hoofed animals are covered with a soft yellow horn, which in some countries it is the custom to remove, from a belief that this removal hardens the succeeding horn. It is unnecessary to state that this is a popular fallacy, and that it is really injurious to deprive the foot of this temporary protection.

The young, with their parents, should be kept apart from others, for some time at least, and especially the equine species; and it must not be forgotten that a mild, dry temperature is most favorable for all young creatures.

Gentle exercise is as necessary for the foal or calf as it is for their parents, a few days after birth; therefore it is that a meadow is preferable to a stable, as, in addition to the more favorable nature of the food, sufficient exercise is afforded. Indeed, with the mare light and regular work may be imposed a short time after foaling, and with much benefit to it and the foal. The latter will follow its dam, provided the pace is not too fast, and a halt be frequently allowed for it to get to the teat. It is astonishing sometimes to observe how well foals travel soon after birth, even over bad roads and during inclement weather, and for great distances, provided the journey is short each day.

Anise (an′is), an aromatic plant of the same order as the parsnip, bearing seeds like it, but smaller. The seeds are principally used for flavoring liquors. Medicinally they are stimulant, like ginger. Sometimes they are used for seasoning confectionery, and the leaves of the plant for garnishing dishes and seasoning food.

Annatto (an-at′to), or **Annotto,** a yellowish-red coloring substance, prepared from the pulp of the seeds of an evergreen tree of the same name in the West Indies and Brazil, and extensively used in coloring Butter and Cheese, which see. Dietetically, it is an abominable drug, and it is often adulterated with poisonous substances, as lead and mercury.

Annual, yearly. An "annual" plant is one which lives but for one season: see Biennial and Perennial.

Anodyne (an′o-dine), a medicine which allays pain. The following is said to be Perry Davis' "pain-killer:" Alcohol, 1 qt.; gum guaiacum, 1 oz.; gums myrrh and camphor, and cayenne pulverized, of each, ½ oz. Mix. Shake occasionally for a week or ten days and filter or let settle for use. Apply freely to surface pains, or it may be taken in teaspoon doses for internal pains, and repeated according to necessities.

Anodyne Plaster. Melt an ounce of adhesive plaster, or diachylon, and while cooling, add a drachm of powdered opium, and the same quantity of camphor, previously dissolved in a small quantity of olive oil. Spread this on leather. This soon relieves an acute local pain.

Anodyne Powder. Opium, ½ oz.; camphor, 3 drs.; valerian, 1 oz.; cayenne pepper, 1 oz. Put the opium and camphor into a close bag; place it on the oven top to harden. Powder and mix. Take a quarter of a teaspoonful at a time. Most valuable in colic, cramp and severe pains.

Antidotes: see Poisoning, and the respective poisons.

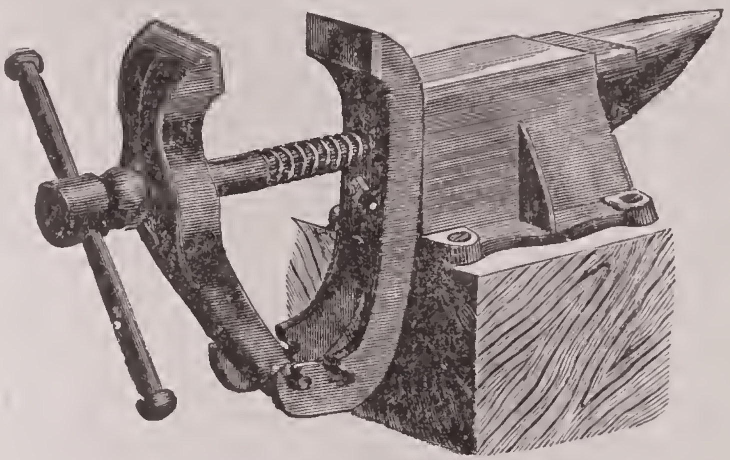
Antimony, and its preparations, as tartar emetic, antimonial wine and kermes mineral, when taken in improper doses, produce faintness and nausea, soon followed by most painful and continued vomiting, severe diarrhœa, constriction and a burning sensation in the throat, cramps or spasmodic twitchings, with symptoms of nervous derangement, and great prostration. Antidote: If vomiting has not been produced, it should be effected by large draughts of warm water and salt, and tickling the inside of the throat, or the stomach pump should be used. Then drink strong astringents, as tea of oak bark, Peruvian bark, gall or green tea. To stop the vomiting, should it continue, put a blister over the stomach by applying a cloth wet with hartshorn, and then sprinkle on the part one-eighth to one-fourth of a grain of morphia.

Antiseptic, preserving flesh from decay; also, anything which preserves flesh from decay is called an antiseptic, as salt, arsenic, creosote, charcoal, alcohol, etc. A septic is that which promotes putrefaction, as warm air, moisture, etc.

Ants, both black and red, are often a great pest about the cupboard and larder. The "remedies" for driving them away are numerous; as, powdered lime, borax, soda, chalk, cayenne pepper, cloves, green sage, wormwood, gas tar, vapor of tar-water, kerosene, anise-seed oil, etc., etc. Most of these remedies seem often to fail, probably because they are not thoroughly applied. Some persons resort to mechanical appliances, like the following, for example: Place the dish to be protected upon a little frame or cup, which is set in another dish of shallow water: the ants will not cross the water. Renew the water two or three times a week, to keep it fresh. A dish of hickory-nuts will attract the large black ants, when they can be easily caught and destroyed. Fresh bones can be used in a similar manner. It is also said that a dish greased with lard and set in the way of red ants, with little sticks for them to climb up on, will soon catch all these pests, by melting off the first lot or two and renewing the dish.

Anvil. The annexed engraving speaks too plainly for itself to need any extended commendation here. It is an anvil and vise combined, the former constituting a very solid foundation for the latter. The anvil is recessed to receive the nut of the vise and the clamp which retains it. The nut can remain in the anvil when the vise is removed. There goes with this apparatus (which is manufactured by A. L. Adams, Cedar Rapids, Iowa), a bolt-header.

The vise is of improved construction, which permits of quickly adjusting the movable jaw so that the two jaws are parallel. This is accomplished by means of notches opening outwardly and upwardly in the forked lower end of the fixed jaw, the movable jaw having a pivot adapted to the notches.



Anvil and Vise, Combined.

Aperient (a-pe′ri-ent), a medicine acting as a laxative, opening and quickening the excretories. They are principally rhubarb, magnesia, Epsom salts, senna, sulphur, ipecacuanha, ginger, etc., made up in various ways. Here is a good one for adults: Epsom salts, ½ oz.; infusion of senna, 6 drs.; tincture of senna, 2 drs.; spearmint water, 1 oz.; distilled water, 2 ozs.; best manna, 2 drs. Mix; and take three or four tablespoonfuls every morning, or every other morning. This is a valuable mixture. A decoction of Peruvian bark will render it a tonic aperient. One for children: Rhubarb, 5 grs.; magnesia, 3 grs.; white sugar, 1 scr.; manna, 5 grs. Mix these and give one or two grains at a dose.

Apiary (a′pi-a-ry), a place where bees are kept: see Bee-keeping.

Apoplexy, a disease in which persons fall down suddenly, being deprived of all sense and motion. The face is red and swollen, eye-lids half closed, and veins of the temples and neck are enlarged and full of blood. The first thing to be done is to check the flow of blood to the head. *Reg.:* The patient should be immediately bled, and a poultice of ground mustard should be applied between the shoulders. A dose of some active physic should be given, and the feet of the patient be soaked in warm water. Give plentifully of warm teas, so as to produce profuse sweating. When the feet are taken from the water, apply strong mustard poultices. Let the diet be very spare. *Ecl., etc.:* The bleeding should always be dispensed with, when it can be done with safety, and the other directions referred to carried out. *Hom.:* A few drops of the strong tincture of aconite in a tumblerful of water; give a tablespoonful every 15 minutes; or, belladonna, 6 globules in 10 tablespoonfuls of water, of which take a teaspoonful every half hour. For the stupor, give opium, in same doses as belladonna. *Hyg.:* Raise the head, loosen all tight clothes, strings, etc., and do all the other things recommended above except the administration of drugs.

Appetite, the desire of food. As to the character and extent of the perversion of appetite, the controversy is too great for us to enter here. Some maintain that it is scarcely pervertible, holding that a confusion is made of appetite, taste and instinct. Appetite is the desire of food, and refers to quantity, and not to quality; taste is for the enjoyment of food, good or bad; and instinct is the only guide to quality, or, as some have it, instinct coupled with reason and experience. But it is a maxim among physiologists that every organ has but one function, and each function but one organ. Be these things as they may, it stands us all in hand to study physiology and hygiene *when we are well*, so that we will not be at a loss what to do when we are sick.

Apple. For use to man the apple stands at the head of the fruit kingdom. For its cultivation and the selection of the best varieties for each locality and situation, etc., there is of course a great variety of opinion, but we will give the substance of the results of experienced horticulturists.

CULTIVATION. The best soil and situation is a deep, rather dry, hard-wood soil, at a moderate elevation, sloping to the north, and with but little exposure to the west wind; in a level country, the highest elevation to be found. Good under-drainage is essential, of course, for the apple, as well as for almost all other plants. A gravelly sub-soil affords such drainage, but this is seldom found thorough enough; therefore artificial drainage must be had, tiling every two rods: see Drainage. Ground of this selection should be prepared by plowing into it about fifty loads of barn-yard manure to the acre. Do not sow with clover, grass or wheat. In the Eastern States, fertilize with marl or quick-lime; on the Western prairies, with lime and salt. Plant corn the first year on wild land, plowing shallow; the second year plow deep and plant to corn or potatoes; also plant the trees; mulch the trees pretty thoroughly before the wet weather of early summer ceases; in planting the trees lean them a little to the southwest, in order to counteract the effect of the strong and constant southwest winds, and to shade the trunk from the violent heat of the afternoon sun of late summer. The third year sow grain, giving a liberal top-dressing of four parts ashes, two of lime, one of plaster, and one of common salt. Plant in the spring when the soil is dry, in rows varying from fifteen to thirty-five feet apart, according to the habit of the trees selected, as some varieties have very spreading tops and some upright. Some prefer close planting, in order for mutual protection and uprightness of limbs. Prune the tops in proportion to the loss of root. Dig the hole large enough to admit all the roots without cramping; put mellow dirt around them, and tramp down carefully, that is, without leaving any of the roots bent out of their natural position. In Southern Ohio it is found profitable to set out good, healthy seedlings, and after two years' growth, graft them three to four feet from the ground. As to pruning, there are doubtless some trees in some situations that will bear very good crops for many years without any pruning at all; but the general advice is to prune moderately, and always do the work with a specific object in view with every branch or twig cut off,—that is, there must be some reason, in the case of every limb cut off, with reference either to removing diseased wood, superfluous branches that are chafing one another, the beauty of the head, keeping the tops low, etc. Better prune too little than too much. Low heads (Fig. 1) should be encouraged for Western cultivation; the limbs should be left on the trunk to within a foot or two of the ground. For this purpose the strong central branches have to be shortened back occasionally. The hemispherical form is the most beautiful for the head of an apple-tree. Remove about one-third of the top the first year, and less and less subsequent years; but be timely, so that no large limbs will grow where they should not be allowed, for limbs larger than an inch in diameter should not be cut off, so far as concerns the good of the tree. Let no limbs be longer than eight feet, and when large limbs are cut off, the stub should be painted as soon as it is dry, to prevent its cracking and rotting. Keep the ends of the limbs well thinned out, to let the sunlight in.

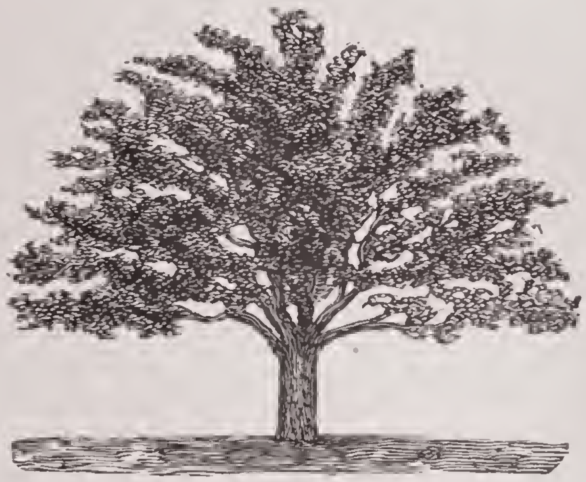


FIG 1.—*Apple-Tree: Low Head.*

Girdling apple-trees to make them bear is advisable under rare circumstances, namely, when the trees are too thick on the ground, and you can afford to risk the sacrifice of some of them, and the girdling can be carefully done, in April. The cut should be narrow, and may be done by fastening a wire around the tree and letting it remain. Girdling will only do for a special object, for it is an attack upon the life of the trees, and recovery from the attack depends upon the extent of the damage and recuperative energy of the tree; some varieties of trees, like some human individuals, will recover, or partially so, from attacks to which others would succumb. It is a law pervading the entire vegetable kingdom that the dying energy of a tree is expended in reproducing its species; and the very fact of the result spoken of, in more and larger fruit, is a sure indication that the tree or branch is nigh unto death. Its full recovery is next to impossible, and its premature decay or death quite probable; hence girdling should be practiced only when trees or branches can well be spared.

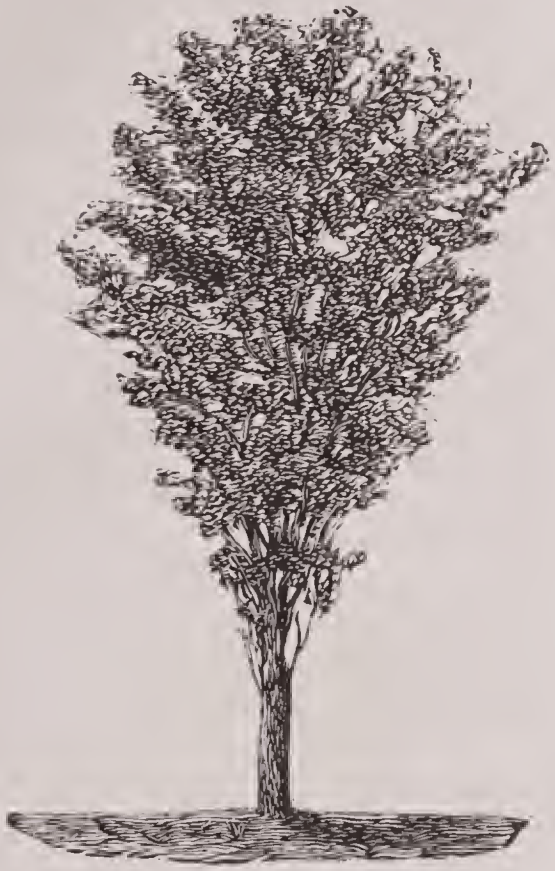


Fig. 2.—*Apple-Tree: High Top.*

Look out in time to avoid uncouth high tops, as Fig. 2, which generally become more scraggy than is here represented. Such high tops as Fig. 3 are to be avoided in countries subject to high winds, as the prairies of the West.

Keep away all suckers promptly. When a tree is beginning to lean too much, straighten up by tying to stakes. Allow no grass to grow near the tree until it has a top heavy enough to shade the ground under it and prevent too strong a sod. Some advocate seeding down to orchard grass the third or fourth year, and others think it should be deferred to several years later. In plowing and hoeing be careful not to tear the bark or the roots; hence the cultivation must be shallower every year until the sod takes complete possession of the ground. See also Grafting, Pruning, etc.

Nursery Cultivation. The more branches you allow to the scions the more roots they will have. During the first year, prune only those that have thrifty forks and assume an upright growth. The idea of trimming is to keep one trunk straight for the future tree.

Examine the young trees carefully in March, after one summer's growth. If the inner bark be much discolored, don't take a shoot off, but if the inner bark and wood looks white and sound, cut away the strong side shoots; again, in June, take off the most upright side shoots, though if very numerous do not remove over one-fourth at one time. In August go over the trees again, still cutting the strong upright shoots, leaving the smaller bracts as before. The work in nursery in the way of pruning is now done. About the middle of October, or before, run a tree digger under the tree roots, draw out the trees and put them in piles on moist soil. Mix in soil among the roots and tops, covering all up completely. In four days the leaves will all drop off when taken up, and the sap flowing will be measurably stopped. In this condition they may be more safely exposed to sun and air. When first taken up with leaves on, evaporation is very rapid, and they must be guarded from the sun and wind. When denuded of leaves in the way indicated, they should go into the hands of the planter, who should bury them root and branch beyond frost. In the spring they will be found as sound as when in nursery the summer before. Plant as early as the condition of the soil will permit in spring, watering each tree as planted with a pail full of water. A fair growth on each tree may be guaranteed with a loss of not over one per

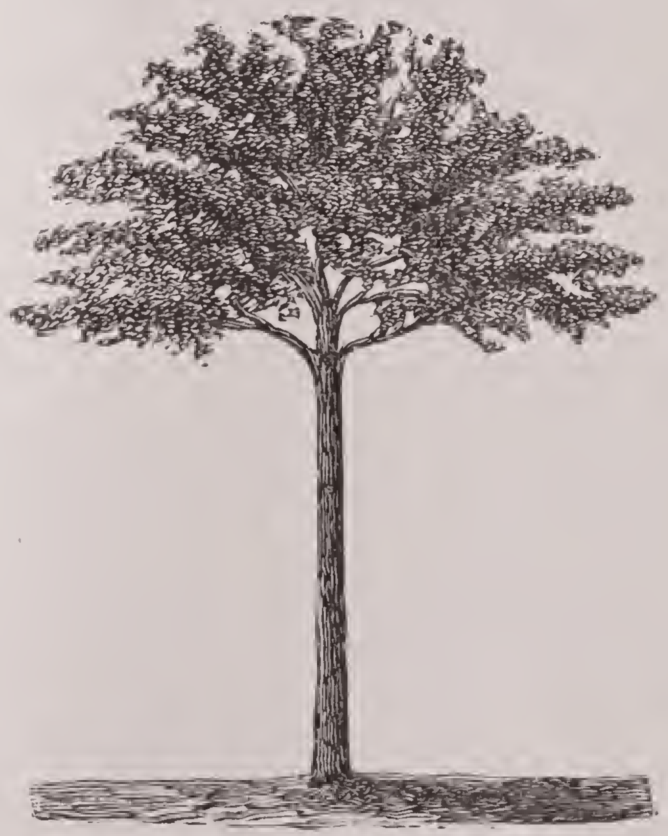


Fig. 3.—*Apple-Tree: High Top.*

cent., always presuming that the soil about the young trees the first season be kept loose and free from weeds. This care in taking up and burying in the fall is to ensure a sound tree to commence with in orchard. The planter must observe the same rules in pruning prescribed for the nursery. It is understood that there will be a considerable amount of limbs on the trees as delivered from the nursery. These extra branches must not be removed until after the buds have begun to swell, and then not all at one time.

INSECTS AND DISEASES. By far the most omnipresent insect among apples is the codling moth, or apple-worm (Fig. 4). It appears in the spring and deposits its eggs in the young apple; the larves hatched from these eggs subsist upon the fruit, causing it to fall before it is grown, and remain even in many winter apples. It is about half an inch long, of gray ashen color and marked with brown and bronze. Remedies: Wisps of hay or cloths put around the tree in one or two places between the ground and the first limbs, in early spring, so that they will catch the moths as they crawl up; every few days take these bands off and kill the worms; keep up this practice all summer. During the month of June, the time of cocooning, is the most important time for this work. Another plan is to pasture the orchard to hogs, which will eat up the young, wormy fruit as it falls, and also help to cultivate by their rooting. Still another good method is to envelope a few inches of the base of the tree with glossy paper during the latter part of May and all of June (in Northern States), so that the larves cannot crawl up. The windows of fruit rooms and cellars where apples have been kept through the winter should be covered with wire gauze during May and June, so that the moths which have come from the fruit may not escape to the orchard. Other methods of catching the moths are: Setting a candle or lamp over a tub of water, in the orchard; hanging old oyster cans to the trees, half filled with vinegar; putting old clothes in the fork of the tree; tacking stiff, brown wrapping-paper around the trunk, with the lower edge flaring out, to catch the larvæ crawling up, when they can be mashed with a mallet; the Weir trap, which consists of a number of shingles fastened together so as to leave crevices between them, where the larvæ will hide, and can be caught, etc., etc.

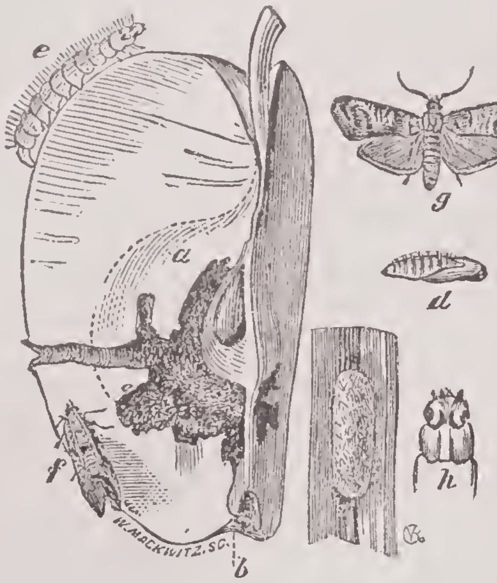


FIG. 4.—*Codling Moth.*

It is also recommended to hunt their nests about sheds and apartments where apples are kept, and to destroy all old birds' nests and other rubbish which may serve as harbors for the moth. Codling moth can be killed by spraying upon the trees, with a pump syringe, as soon as the fruit sets, a solution of one pound of arsenic boiled in 100 gallons of water; or, Paris green, a small tablespoonful to the barrel.

The next greatest pest perhaps is the borer, of which there are two kinds, the flat-headed (Fig. 5), and the round-headed (Fig. 6). The latter is the most common kind, and works near the ground, throwing out his saw-dust castings. Look for depressions or discolorations in the bark, and with a flexible wire, knife or narrow chisel, hunt up the larves and kill them one by one. Cover the wounds made in the tree with grafting wax. To kill the eggs and prevent them from being laid, thoroughly scrub the trunks of the trees every year, during the last half of June, with hot soft soap. A cheap sheet-iron pail can be made, having a second bottom below, containing room for a kerosene fire or lamp of some kind, or charcoal or pine wood, and by this means it is easy to keep the soap hot while it is being carried from tree to tree. Later in the year,

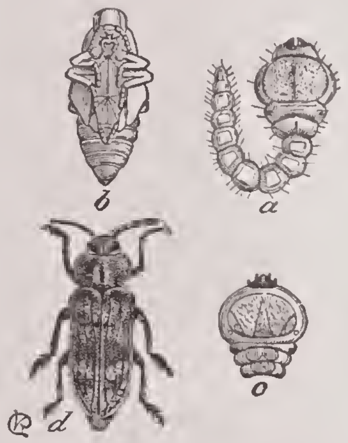


FIG. 5.—*Flat-headed Apple-tree Borer.* (Chrysobothris femorata.) *a, larva; b, pupa; c, under side of head; d, beetle.*

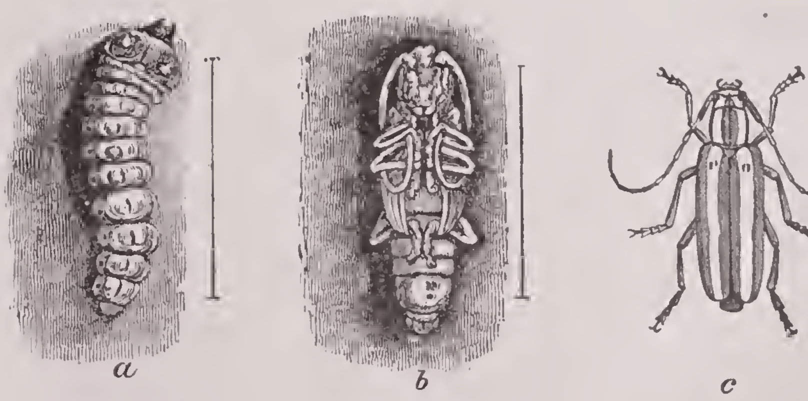


FIG. 6.—*Round-headed Apple-tree Borer.* (Saperda candida.) *a, larva; b, pupa; c, developed form.*

and indeed at any time, the bark should be examined and suspected places dug into with a knife in search of borers. The above is also the best general treatment against all species of bark lice and many other insects, as well as fungoid diseases. Strong soap-suds, soda, kerosene or lye is often used. If these are immediately washed off by a rain, the application should be made again. Carbolic acid is an excellent ingredient, in weak soap-suds or water, in the proportion of one ounce of the acid to 50 trees. The old practice of whitewashing is condemned, as it prevents a free exhalation through the bark; acts too much like a coat of paint.

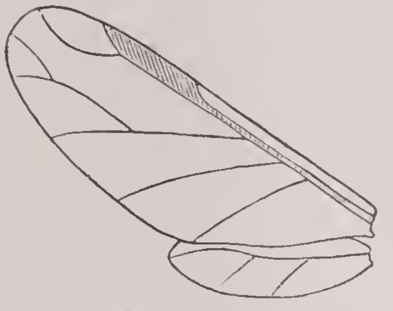


Fig. 7.—*Wing of Apple Louse, magnified.* (Aphis mali.)

Caterpillars should be kept off by using a brush, say a mullein spike tied to the end of a pole, or something of the kind. It is well, also, to destroy all the caterpillars on wild cherry-trees in the vicinity of the orchard. The brush used may be dipped in strong soap-suds, or a weak solution of coal oil or carbolic acid.

The cankerworm is an increasing pest, going westward in its march. There are two species, the spring and the fall, and they strip the foliage, not only from apple-trees, but also from peach, cherry, elm, etc. To prevent the females from ascending the trees to deposit their eggs, a band of coarse cloth, six inches or more wide, may be put round the tree and then smeared with tar or a mixture of tar and molasses.

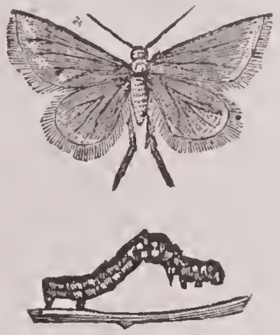


Fig. 8.—*Canker-worm.*

A hay rope may be put round the tree and over this a ring of tin wide enough so that there will be free tin below the rope, and the whole securely fastened, being careful that there are no crevices between the tin and the tree through which the insects may pass. The tin should be smeared on the inside with printer's ink, tar, or a mixture of castor oil and kerosene. In both these cases the moths will lay their eggs below the bands if prevented from going above them. To insure success, these should be sought and killed, as, if allowed to hatch, it will be much more difficult to keep them from ascending the trees than it was the moths. Coal tar should be used only on old trees. When the tar hardens a little, the application must be renewed.

When the worms are already in the tree, if the trees are not too large, a sudden jarring will cause them to be detached from the leaves or twigs, and hang suspended, when they may be swept down by passing a switch between them and their support, and they may be destroyed.

Washes of Paris green and other substances may be resorted to when they are in the tree, but it is probable that where the tree is small enough to make the application of washes practicable, a few times jarring will answer the same purpose.

If the worms have entered the ground and changed to chrysalids, fall plowing will, if the ground be mellow, break up their slender cocoons, and expose them to the action of the weather, which, with the birds, will destroy most of them. Co-operation of neighboring orchardists is necessary to perfect success.

The bunches of crumpled leaves seen remaining on apple and other trees during the winter, are the work of the apple-leaf crumpler, Fig. 9. The caterpillar when full grown, in summer, is of a dull green color, the head darker. Pick the leaves off in winter and pile them up at some distance from the orchard, where the vermin will starve to death, and at the same time their parasites will live, to prey upon the crumplers of future generations.

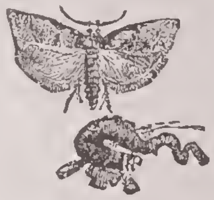


Fig. 9.—*Apple-leaf Crumpler.*

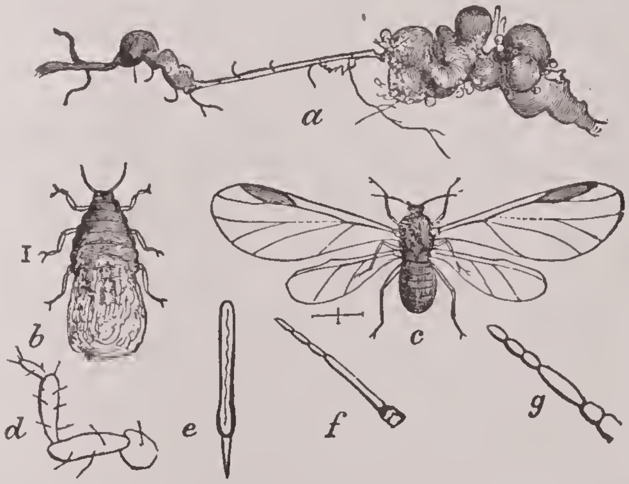


Fig. 10.—*Apple-root Louse.* (Schizoneura lanigera.) *a, the infested rootlet; b, the woolly larva; c, the winged insect, with the woolly matter all removed; d, leg of the perfect insect; e, the beak; f, antennæ of the winged insect; g, antennæ of the larva.* (Natural size shown by straight lines.)

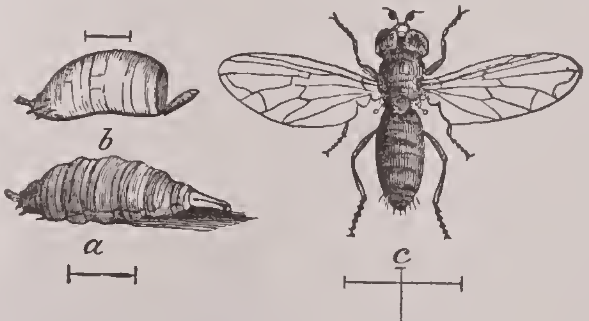


Fig. 11.—*Root Louse Syrphus Fly.* (Pipiza radicum.) *a, larva; b, pupa; c, perfect fly.*

The "woolly blight," or apple-root louse (Fig. 10), is the work of a woolly louse, causing warty excrescences about the roots. Remedy: Washes of strong soap-suds. The Syrphus fly (Fig. 11) preys upon it, and is thus indirectly a friend to human interest. The straight lines in the cuts indicate the natural size of the insects.

The New York weevil (Fig. 12) works in the twigs. Insects of this species can be readily jarred off, collected in sheets, and destroyed. Two or three species of Ips (Fig. 13) eat their way into mature fruit, but they are not very troublesome. Proper care in removing decaying fruit and gathering carefully and in due season that which is ripe, will probably prevent any injury from this little creature. The apple curculio (Fig. 14) eats into the young fruit. The only two remedies are gathering the infested fruit and destroying it, and the selection of varieties not subject to its attacks, if indeed there are such varieties. The insect is rare in the North. For the two species of Buprestid borers, the white-lined Psenocerus, the cylindrical bark borer and the apple-twig borer, look over the trees in autumn and cut off the infested twigs. The scale insect is destroyed by the usual alkaline washes. The bud worm is a small, naked caterpillar about one-third of an inch long and brown in color, with small warts, and black ring near its head. No special remedy. The palmer worm is destroyed with whale-oil soap and water. The 17-year locust preys upon the roots of the apple-tree for a portion of his 16 years' apparent absence, and the 17th year the females score the twigs for the deposit of eggs. No remedy. If rabbits or mice show signs of their work on the trees, remove the mulching a few inches from the tree and put on some distasteful drug, or in the fall put around the trees for about two feet up, old sheet-iron or tinware from old stove-pipes and refuse kitchen furniture. Remove this in the spring as soon as herbage becomes green. Mice alone can be guarded against by simply piling up, late in autumn, a conical mass of earth about 16 inches high around the tree and spatting it down smooth. This should be removed again in the spring.

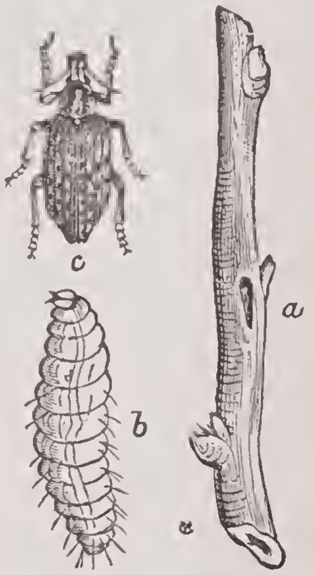


Fig. 12.—*New York Weevil.* (Ithycerus Noveboracensis.) *a, infested twig; b, larva; c, perfect insect.*

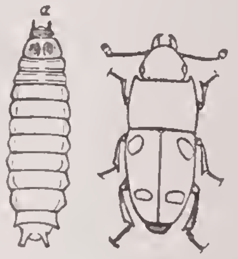


Fig. 13.—(Ips faciatus.) *a, larva; b, beetle.*

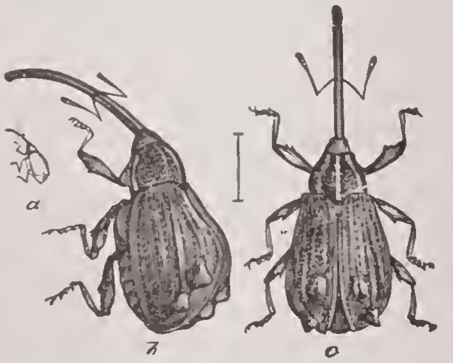


Fig. 14.—*Apple Curculio.* (Anthonomus quadrigibbus.) *a, natural size; b, side view; c, back view.*

The most common disease among apple-trees, especially in the West, is twig blight, supposed to be caused by a microscopic bacterium. No remedy is known, except to plant the trees on hillsides and in light soils, for the disease affects mainly those trees which are set in a rank, rich soil, like that of the Western prairies. One ounce of copperas to eight or ten gallons of water forms a good wash, and is advised for trial as preventive against blight. A Wisconsin man, in one instance, reports that he found the pruning knife a success. In using the knife, dip it in a strong solution of carbolic acid every time in passing from one limb to another, in order to kill the disease matter on the knife and prevent the spread of the blight by inoculation.

The most effectual safeguard against having spotted fruit is to avoid planting those varieties which bear it. Those most subject are Newtown Pippin, Fall Pippin, Early Harvest, Rambo, Fameuse and Canada Red. The varieties most free are the Russets, Baldwin, Red Astrachan, Gravenstein, Duchess of Oldenburg, etc.

HARVESTING, PACKING, ETC. As soon as the seeds turn brown and before thè fruit begins to soften or become mellow, pick them from the tree. For long keeping and for high prices they should be handled as carefully as eggs, and never poured from one vessel to another as we do potatoes. Use step-ladders. For marketing it will always pay to carefully sort the apples into two or three classes. All those in one lot should be of a uniform size and appearance as nearly as practicable. Allow no poorer apples to go into a lot of better apples designed for market. Barrel tight, so that the apples will not rattle about in shipping and become bruised. Keep in a cool place in an out-door shed until freezing weather, and then put into a cellar or other room where they will be next to freezing until used.

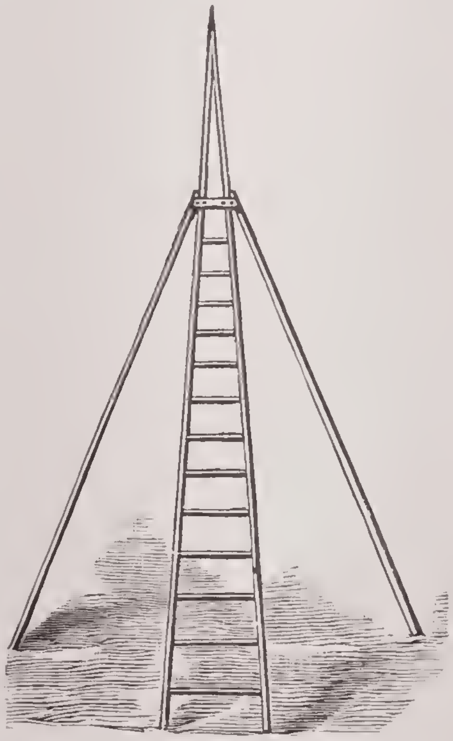


Fig. 15.—*Fruit Ladder.*

To keep winter apples in the very best manner, they should be gathered by hand on a dry day, as late in the autumn as is safe from injurious frosts, then put them into new, tight flour barrels, shaking them down and placing the head in tightly, with considerable pressure upon the apples; place them in a cool, shady exposure, as a dry shed or on the north side of a building, until the weather is cold enough to justify putting them into the cellar. If practicable, it is well to ventilate them with the cool air of dry nights and protect them from the circulation of the warm air of day. The cellar should be kept just at or above freezing point, dark, clean and well ventilated. Some prefer placing the fruit on a dry floor, as soon as they are picked, and after a week they examine them, to see if the "sweat" is about gone, and if so, they look them all over, and wipe perfectly dry those which are not already so, and pack them in the barrels. Some put clean rye straw between the layers of apples in the barrels. In the cellar the barrels are placed on their sides, in tiers. Boxes and barrels containing apples should be self-ventilating; but the sorts which incline to wilt, like the Russets, may be kept more confined, to prevent evaporation.

Apples are often kept by burying them outdoors like potatoes, but there is some risk in this method, and the fruit always soon decays after exposure to the air. Fig. 16 shows an excellent style of pit for this purpose. The only peculiar feature about it is the provision for ventilation. The bottom of the pit should be high enough to prevent water from reaching it. This may be accomplished by means of a drain if desired, or the bottom may be raised a few inches above the surrounding surface. Place a small gas-pipe (or any other) in the bottom, as shown in the cut, connecting the apples with the outside air. Arrange a similar pipe at the top. This produces a current of air through the entire pile. In extreme cold weather it may be necessary to close the pipes, opening them again when the weather moderates. Put a screen over the protruding ends to keep vermin out. In covering, place alternate layers of straw and soil, as shown in the cut.

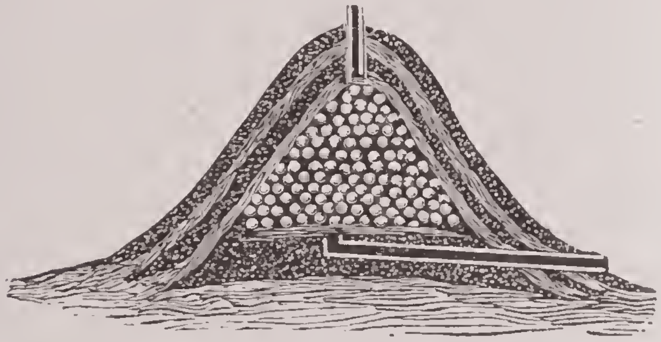


Fig. 16.—*Apple or Vegetable Pit.*

Varieties. To give a condensed description of many apples, both of the fruit and of the tree, it will be necessary to use a few short terms very frequently, which for beginners in fruit-raising we explain. The stem end of the apple is its base, and the flower end is the apex. The hollow portion at the base is the cavity, and that at the apex is the basin. In the center of the basin is the calyx, consisting of the small leafy tips of the flower cup. The general shape of an apple may be round, roundish, oblate, oblong (Fig. 18), conical, etc. The oblate is also termed "flat" (Fig. 17), and the conical is the shape of a cone or egg (Fig. 19). Truncate signifies flattened at the apex. Some apples are ribbed, having ridges; some corrugated, having depressed lines, furrows, or wrinkles; and some unsymmetrical, that is, having the sides unequal. The terms fair, good, very good, best, etc., have a sort of technical meaning, indicating the general comparative quality in the best situations and in good cultivation. The best time for using the fruits is indicated by the months named. As to the tree, it may be strong, vigorous, weak, slender, short-jointed, hardy, spreading, round-headed, etc. Young shoots are understood to be a dull reddish brown and downy, unless otherwise noted.

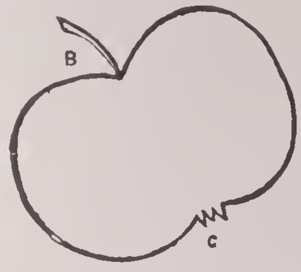


Fig. 17.—"*Flat*" *Apple. B, cavity; C, basin.*

Our list here comprises over a hundred of the best varieties of apple, the thousand others being purposely neglected by Northern orchardists. Pomologists for the last forty years have generally been endeavoring to restrict the number of varieties in cultivation. There are thousands of synonyms for apples, many varieties having 10 to 20 names; and should any one fail to find a good Western apple in the following list by the name known to him, he may ascertain the name we adopt by consulting Downing's work. We endeavor to give all the most popular names.

Alexander, *Emperor Alexander*, *Russian Emperor*, *Victoria*. Fruit scarcely good except for cooking, and falls badly from the tree; season, Aug. to Dec. Very large, fair and handsome, conical, truncated, sometimes obscurely angular, smooth, pale yellow, striped and splashed; distinctly bright red, sometimes shaded mixed red; basin medium; eye small, long, closed; cavity deep, narrow, brown; stem medium to short, stout; core wide, nearly closed; axis short; seeds large; flesh whitish, breaking, not fine grained, juicy, acid, not rich. Tree medium size, spreading, and an early bearer.

Fig. 18.—*Oblong Apple.*

American Golden Pippin. Medium to large, roundish oblate, inclining to conic, obscurely ribbed, yellow, sometimes brownish-blush in the sun, thinly sprinkled with gray dots, often slightly netted with thin russet; stem short, moderately stout; cavity large and deep; calyx closed; basin broad and slightly corrugated; flesh yellowish, breaking, juicy, rather coarse, rich, aromatic, subacid; core rather large. Very good. Nov. to Feb. Good for both table and market. Tree strong, with round, spreading top, similar to R. I. Greening but less drooping; does not bear young, but very productive when advanced. Wood dark reddish, downy, with prominent flattened buds.

American Golden Russet. Small, roundish, ovate, dull yellow, sprinkled with a very thin russet; stem rather long and slender; calyx closed; basin narrow; flesh yellowish, very tender, juicy, mild, rich, spicy. For the table. Best. Oct. to Jan. The flesh of this apple is so tender as to resemble that of a buttery pear more than of an ordinary apple. Tree not very handsome or large.

American Summer Pearmain. Medium, oblong, wider toward the apex, red, spotted with yellow where grown in the shade, but when in the sun it is streaked with livelier red and yellow on the sunny side; stem three-fourths of an inch long and deeply inserted; calyx closed; basin abrupt and slightly corrugated; flesh yellow, remarkably tender, rich, pleasant-flavored, and often bursts in falling from the tree. For the table. Best. Core medium. Fruit ripens gradually from Aug. 10 to Sept. 30. Tree moderately vigorous, with slender branches and round head.

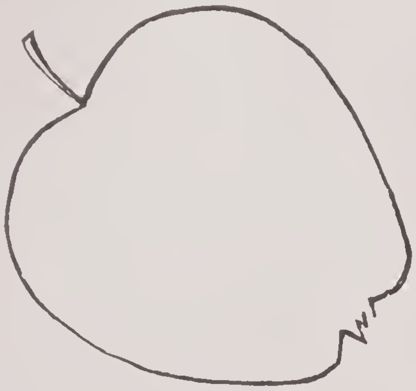


FIG. 19.—*Conical Apple.*

Bailey's Sweet. Large, roundish conical, often approaching oblong, obscurely ribbed, sometimes angular, yellowish, mostly shaded and obscurely striped with red and mottled or thickly sprinkled with minute dots; stem rather slender, inserted in a narrow, green cavity; calyx small, closed and set in a narrow, irregular basin; flesh white or yellowish, tender, not very juicy, almost melting, and of a honey-sweet flavor; core rather large, turbinate, open. Seeds numerous, angular, dark. Very good. Profitable for all purposes, but rather tender-skinned. Nov. to March. Tree vigorous, upright, spreading, productive.

Baldwin. The most popular apple in the North, on account of its good keeping qualities and general good properties. Large, roundish, narrowing a little toward the apex; yellow in the shade, but nearly covered with crimson stripes and red and orange when grown in the sun, dotted with a few russet dots, and with radiating streaks of russet about the base; calyx closed; basin narrow and plaited; stem three-fourths of an inch long, slender; cavity even and moderately deep; flesh yellowish white, crisp, sparkling, high-flavored. Very good. Table and market. Nov. to March. Tree a vigorous, upright grower and bears abundantly; top spreading.

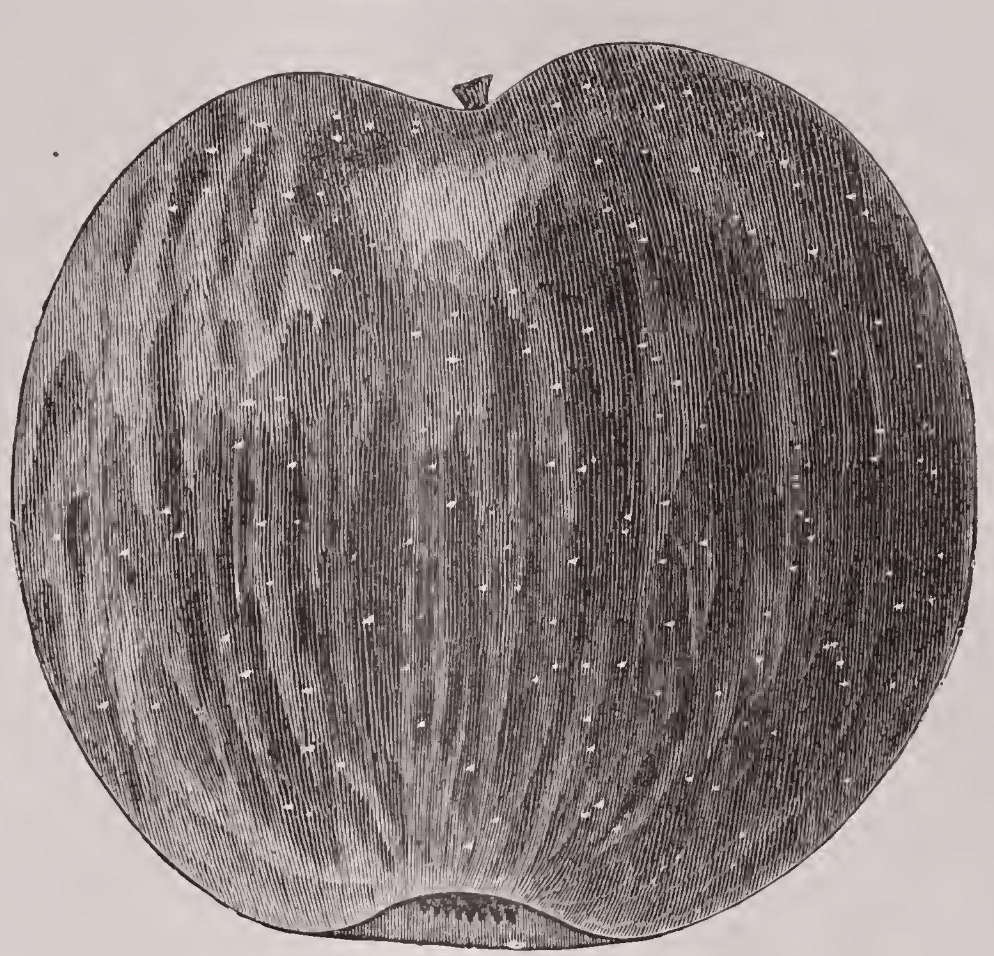
Baltimore. Medium size, roundish-conical, regular, pale yellow shaded with light red, striped and splashed with dark red, almost purplish, having a grayish appearance of bloom, large light dots, with a dark center; stem short; cavity medium size, rather thinly russeted; calyx small, closed; basin shallow, nearly smooth; flesh whitish, tender, juicy, mild, subacid; core medium. Very good. Dec. to April. Tree healthy, hardy, moderately vigorous, head round; young shoots dull reddish brown. Fruit for table or market.

Belmont. Medium to large, globular, a little flattened and narrower toward the apex, sometimes oblong, light waxen yellow, often with a vermilion cheek; stem short; cavity generally large; calyx usually closed; basin rather deep, and corrugated; flesh yellowish, crisp, tender, juicy, sometimes almost melting, of a mild agreeable flavor. Very good. Table. Nov. to Feb. Tree vigorous, healthy and productive. Wood a smooth, light reddish brown.

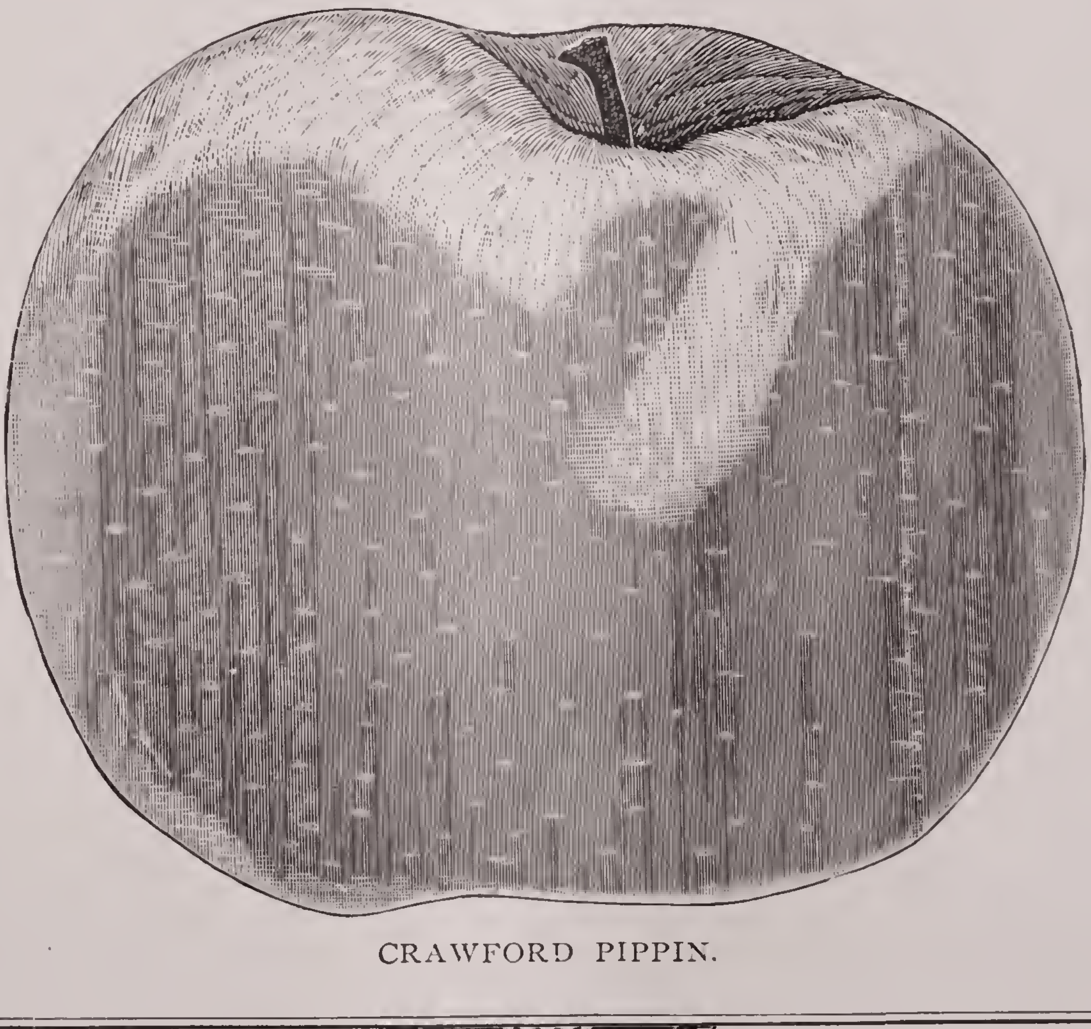
Ben Davis. One of the most popular apples at the present time, more, however, on account of its fine appearance than of good eating qualities; but the people are learning to like them. Medium to large, roundish, truncated conical, often unsymmetrical; yellowish, but mostly overspread with stripes and splashes of two shades of red, and dotted sparsely with areole dots; stem medium, rather slender; cavity narrow, deep, russeted; calyx partly open; basin wide, abrupt and slightly wrinkled; flesh white, tender, moderately juicy, pleasant, subacid. Good. Market. Better in the South and Southwest. Dec. to March. Core medium to large. Tree a hardy, free grower, with very dark, reddish brown, slightly grayish young wood, erect round head, bearing early and abundantly.

Benoni. Table and market. Below medium size, roundish-oblate, conical, pale yellow, shaded, striped and marbled with dark crimson, and thinly sprinkled with bright dots; stem short, slender; cavity deep russeted; calyx closed; basin abrupt, quite deep and somewhat uneven; flesh yellow, juicy, tender, pleasant, subacid; core small. Very good. Aug. Tree vigorous, upright, spreading, hardy, productive, light reddish brown.

Bentley's Sweet. Medium, roundish, flattened at ends, sometimes unsymmetrical, pale yellowish green, shaded with pale red and moderately sprinkled with light and brown dots; stem long, slender, curved; cavity smooth, deep; calyx large, closed, or partially open; basin large, deep, corrugated; flesh fine, whitish, compact, sweet, somewhat honeyed flavor; core small. Very good. Jan. to May. Market and keeping. Tree mod-



ISHAM SWEET.



CRAWFORD PIPPIN.

erately vigorous, hardy, good bearer and keeper, and particularly valuable in the Southwest.

Bethlehemite. Table and market. Medium, oblate, inclining to conical, regular, pale yellow, striped, shaded and splashed with light and dark red nearly all over, with a thin grayish tinge, and thickly sprinkled with light and brown dots; stem rather short, slender; cavity large and russeted; calyx open or partially closed; basin large and slightly corrugated; flesh white, compact, crisp, juicy, rich, mild, subacid, slightly aromatic; core small. Seeds numerous, short, very plump, pale. Very good. Dec. to March. Tree upright, strong, stocky, short-jointed; young shoots dull reddish brown and downy, productive.

Black Gilliflower. Table. Medium, oblong conical; dark, dull red; flesh white, dry, mild, subacid. Good. Nov. to Feb. Tree very productive.

Bonum. Table and market. Medium, oblate, yellow, mostly shaded with deep crimson and indistinct stripes and splashes of dark red, rather thinly sprinkled with pretty large light dots, a portion of them having a dark center; stem long and slender; cavity medium to large, often with a little green russet; calyx closed; basin shallow, slightly corrugated; flesh white, often stained next the skin, firm, tender juicy, rich, mild, subacid; core small. Very good. Nov. to Dec. Tree upright, spreading, hardy, vigorous, and early and abundant bearer. Young shoots a smooth reddish gray.

Broadwell. Table and market. Medium, oblate, somewhat conic, clear bright yellow, brownish blush in the sun exposure, with carmine spots; dots few, greenish, suffused beneath; stem rather short; cavity broad, russeted; calyx closed; basin abrupt, regular; flesh whitish, firm, juicy, rich, sweet; core small. Very good. Nov. to Feb. Tree vigorous, quite hardy, very spreading, irregular, productive. This is an extremely valuable sweet apple.

Buckingham. Table and market. Medium to large, oblate, inclining to conic, greenish yellow and mostly covered, shaded, striped and splashed with two shades of crimson or purplish red, and many light brown dots; stem short; cavity broad, deep, slightly russeted; calyx closed; basin rather large, deep, slightly corrugated; flesh yellowish, rather coarse, breaking, tender, juicy, mild, sprightly, subacid; core small. Very good to best. Nov. to Feb. Tree hardy, healthy, moderately vigorous and productive, of a round head, spreading and of a medium size. Does best in the Ohio River Valley and Southwest.

Campfield. Cider, market and keeper. Medium, roundish, rather flattened, smooth, washed and striped with red over a greenish yellow ground; flesh white, rather dry, firm, rich and sweet. Good. April and May. Tree large, symmetrical, with straight, spreading limbs, and very productive. This is a capital New Jersey cider apple, and is also good for baking and stock-feeding.

Canada Reinette. Table and market, Oct. to April. Largest size, oblate, conical, flattened, rather irregular, with projecting ribs, broad at the base, narrowing toward the apex, with three deep, greenish yellow channels, slightly washed with brown on the sunny side, sprinkled with russet patches; stem short, inserted in a wide cavity; calyx short and large, set in a rather deep, irregular basin; flesh nearly white, rather firm, juicy, with a rich, lively, subacid flavor. Very good to best. Tree spreading, open, vigorous and productive. An extremely popular apple in Europe and Canada.

Carolina Red June. Very good, for table and market. Medium or below in size, oval, irregular, inclining to conic, smooth, and nearly all over shaded with deep red, and almost of a purplish hue on the sunny side, and covered with a light bloom; stem variable in length; cavity small; basin narrow, plaited; calyx closed; flesh very white, tender, juicy, with a brisk, subacid flavor; core rather large. Tree upright, vigorous, an early and abundant bearer, much esteemed at the South and Southwest as their best early apple; equal to the Early Harvest in flavor and more profitable as an orchard fruit. The Carolina Striped June is another variety of apple about as good as the Red, and indeed scarcely distinguishable from it; it is generally more striped.

Carthouse. See Gilpin.

Cayuga Redstreak. See Twenty-Ounce.

Chenango Strawberry. Very good for table. Medium, oblong conic or oblong truncated conic, indistinctly ribbed, whitish and shaded, splashed and mottled with light and dark crimson over most of the surface; light dots; stem short, small; cavity acute, somewhat uneven; calyx closed, or partially open; basin rather large, abrupt, slightly corrugated; flesh white, tender, juicy, peculiarly mild subacid; core rather large. Sept. and Oct. Tree vigorous, spreading.

Cogswell. Very good to best, for table and market, Dec. to March. Above medium, regular, roundish oblate, rich yellow, nearly covered with red, marked and streaked with bright red, pretty thickly sprinkled with areole dots; stem short, slender; cavity large, thinly russeted; calyx small, nearly closed; basin small, shallow; flesh yellowish, fine-grained, tender, juicy, scarcely subacid, rich, aromatic; core small. Tree vigorous, upright, spreading, abundant bearer, and fruit even-sized.

Cooper's Early White. Best summer apple for Nebraska, etc.

Crawford Pippin. A new variety.

Dominie. Excellent for table and market, from Dec. to April. It resembles the Rambo, being of medium size, flat, lively greenish yellow in the shade, with stripes and splashes of bright red in the sun, and rather large russet specks; stem long and slender, planted in a wide cavity and inclining to one side; calyx small, in a broad basin, moderately sunk; flesh white, exceedingly tender and juicy, with a sprightly pleasant flavor, though not high. Young wood of a smooth, lively light brown. Trees hardy and the most rapid growers and prodigious bearers in existence.

Duchess of Oldenburg. Medium, regular, roundish oblate, smooth, finely washed and streaked with red on a golden or yellow ground; calyx pretty large and nearly closed, set in a wide, even hollow; there is a faint blue bloom on the fruit; flesh juicy and sprightly subacid; ripens early in September. Cooking and market. Tree vigorous, with roundish, upright, spreading head, requiring little or no pruning and is an excellent bearer. Young shoots smooth.

Dyer, *Pomme Royale*, *Golden Spice*. Medium, roundish, regular, smooth, pale greenish yellow, with a faint blush and a few dark specks on one side; stem about half an inch long, set in a smooth round cavity; calyx closed; basin plaited, moderately deep; core round, hollow; flesh white, very tender and juicy, of very mild and agreeable flavor, aromatic, slightly subacid. Very good to best. Table. Sept. to Oct.

Early Harvest, *Early French Reinette*, *July Pippin*, *Large White Juneating*. Very good to best, for table and market; the smallest collection of apples should comprise this and the Red Astrachan. Fruit medium size, roundish, often roundish oblate, very smooth, bright straw color, with a few faint white dots; stem half to three-fourths inch long, rather slender; cavity of moderate depth; basin shallow; flesh very white, tender, crisp, juicy, rich, sprightly subacid; core small. Tree moderately vigorous, an abundant bearer, having an upright, spreading head.

Early Joe. Best for table; ripens from middle of August to middle of September; fruit small, oblate, very slightly conic, smooth, yellowish, shaded and striped with red and thickly sprinkled with greenish spots; stem of medium length; cavity large, surrounded with russet; calyx closed; basin moderate; flesh whitish, tender, juicy, with an agreeable vinous flavor. Tree of slow growth, productive, and requires high culture. Luce's Early Joe is another apple, not so good, but larger.

Early Pennock, *Shaker Yellow*, *Harmony*, *Hominy*, *etc*. Good to poor, market and cooking, July to Sept. Large, variable in form, conic, handsome, smooth, yellow, partially covered with mixed and striped scarlet, splashed carmine,—often yellow prevails; dots numerous, dark; basin shallow, plaited or regular; cavity deep, brown; stem medium or short; core long, tapering to both ends, partially open in some; seeds large, numerous, dark; flesh yellow, breaking, rather coarse, acid. Tree thrifty, upright, early bearer, not long-lived.

Early Strawberry, *Red Juneating*. Very good, table and market. Roundish, narrowing toward the apex, smooth, fair, finely striped and stained with bright and dark red, on a yellowish white ground; stem inch and a half long, rather slender and uneven; cavity deep; calyx small; basin shallow and narrow; flesh white, slightly tinged with red next to the skin, tender, subacid and very sprightly and brisk in flavor, with an agreeable aroma. In market from July to Sept. A beautiful apple.

Edgar Redstreak, *Walbridge*. Jan. to May. Medium size, oblate, pale, whitish yellow, shaded with pale red in the sun, narrow stripes, and a few splashes of bright red over most of the surface where fully exposed; stem short, small; cavity sometimes slight russet; basin small, slightly plaited; flesh white, fine, crisp, tender, juicy, mild subacid; core small or medium. Tree hardy, upright at first, but spreading with age and weight of fruit.

English Russet. Good. Market and keeper. Jan. to May. Medium, roundish, slightly conical, regular, pale greenish yellow, about two-thirds covered with russet, which is thickest near the stem; calyx small; basin even, round and moderately deep; stem rather small and deeply inserted in a narrow, smooth cavity; flesh yellowish white, firm, crisp, mild, slightly subacid. Tree very straight, head upright, and the wood smooth and reddish brown.

English Sweet. See Ramsdell's Sweet.

Esopus Spitzenburg, or *Æsopus Spitzenberg* (spelled variously). Best for table and market, Dec. to Feb. Large, oblong, tapering roundly to the apex, smooth, nearly covered with rich, lively red, dotted with distinct yellowish russet dots on the shaded side, a yellowish ground with streaks and broken stripes of red; stem rather long, slender; cavity wide; calyx small and closed; basin shallow and slightly furrowed; flesh yellow, rather firm, crisp, juicy, deliciously rich and of a brisk flavor; seeds in a hollow core. Tree has slender shoots and long, hanging limbs. In progressing Westward, this fruit has become larger and more irregular and less brilliantly colored, less highly flavored and less productive. In some regions the tree is subject to blight, and unprofitable.

Evening Party. Best for table and market, Dec. and Jan. Medium to small, regular, quite flat, smooth, mixed red and carmine stripes, on waxen yellow ground; dots numerous, distinct, grey; basin abrupt, regular, deep; eye small, closed; cavity wide, deep, regular, brown; stem medium, green, slender; core small, regular, closed, touching the eye and short; seeds short, wide, dark; flesh light yellow, very fine grain, tender, juicy, subacid, aromatic. Tree roundish, upright, spreading, with slender branches; young shoots dark greyish brown, many small dots; fruit hangs well to the tree and the foliage remains until very late.

Fallawater, *Tulpehocken*, *Pound Mountain Pippin*, *Winter Blush*, *etc.* Good for market and stock, Nov. to Feb. Large, round or oblate, conic, regular, greenish yellow, often blushed crimson or shaded with dull red, sprinkled with large grey dots, large specimens covered with whitish veined marks; basin deep, regular; eye large, open; cavity deep, regular, brown; stem short, stout; core medium, closed; seeds numerous, angular; flesh whitish, often greenish white, light, tender, juicy, very mild subacid or sweet, with little character. Tree vigorous, spreading, productive, not long-lived; shoots very stout, dark; leaves large.

Fall Pippin, *Pound Pippin*, *Pound Royal*, *York Pippin*, *etc.* Best for table, market and drying, Sept. to Dec. Large, handsome, globular, truncated, regular, smooth, rich yellow, frequently blushed at the North, with finer skin; dots minute, grey; basin deep, abrupt, regular, marked with concentric rings, which often crack open in large Southern specimens; eye large, open; cavity wide, regular, or narrow, deep; stem long; core large, regular, closed; seeds pointed, often imperfect; flesh yellow, breaking, compact, fine grained, acid, aromatic, delicious, becoming tender and mellow. Tree exceedingly vigorous, large, wide, branching, open head; not an early bearer; shoots stout, dark; leaves large, broad.

Fall Orange, *Holden Pippin*, *Orange*, *Red Cheek*, *White Graft*. Good for cooking in autumn. Large, roundish, pale yellow, sometimes with a dull red cheek, and sprinkled with brownish dots; stem short; cavity narrow, deep, slightly russeted; eye large, partially closed; basin deep, narrow; flesh white, tender, juicy, acid. Tree strong, erect, productive, hardy; young shoots smooth.

Fall Stripe, *Saxton*. Good to very good; Sept. Medium size, roundish, oblate, yellow, shaded, striped and splashed with light and dark red over the whole surface, having a few light and brown dots; stem short, small; cavity slightly russeted; eye closed; basin slightly corrugated; flesh yellowish, a little coarse, juicy, tender, subacid, slightly aromatic; core small. Tree has a handsome round head, is an early bearer and very productive on alternate years.

Fall Wine. Best for table, Sept. to Nov. Medium, oblate, handsome, inclined to crack open if left on the tree till ripe, very smooth, waxen yellow, almost completely covered with bright and often deep red, upon which it is indistinctly striped; numerous russet dots; basin abrupt, wide, regular or wavy; eye small, closed; calyx reflexed; cavity wide, regular, uniformly green; stem long, slender; core medium, regular, closed; seeds numerous, angular or plump; flesh yellow, breaking, tender, fine-grained, juicy, mild subacid, very aromatic. Tree of medium size, rather slender but healthy, spreading and annually productive.

Fall Winesap. Good, Oct. and Dec. Medium, roundish, yellowish green, with considerable blush in the sun; flesh white, fine-grained, tender, juicy, subacid. Tree clean grower, moderately spreading, somewhat drooping as it acquires age, productive and an early bearer.

Fameuse, *Snow*. Good for table and market, Oct. to Dec. Medium size, round, regular, pale waxen yellow, almost wholly covered with deep red, made up of stripes and splashes which become faint on the shaded portions; dots minute; basin medium, regular; eye very small, closed; cavity wide, wavy, green; stem short; core medium, heart-shaped; seeds numerous, pointed, rich brown; flesh snowy white, very tender, fine-grained, juicy, subacid, mild, delicately perfumed but not rich. Tree moderately vigorous, round-headed, hardy.

Garden Royal. Best for table, Aug. and Sept. Small, roundish, oblate, greenish yellow, shaded, striped and splashed with rich red, a little dull or greyish toward the stem, sprinkled with light and grey dots; stem slender; cavity deep, acute; basin shallow; flesh yellow, very tender, juicy, rich, mild subacid, aromatic; core small. Tree of moderate very upright growth, roundish, regular head, very productive.

Gilpin, *Carthouse*, *Little Romanite*, *Little Red Romanite*, *etc.* On account of the value of this apple for cider and for stock feeding, it has acquired in the West the sobriquet of "Dollars and Cents." Fruit medium size, round, truncated at the ends, large specimens often somewhat irregular, very smooth, deep red all over; stripes indistinct; dots minute and indented; basin wide, regular or folded; eye small, closed; cavity deep, acute, regular, brown; stem very short; core medium; seeds few, large, plump; flesh greenish yellow, firm, juicy, sweet, rich, but not good for the table except in the spring; bruises do not rot; valuable for its cider from the richness of the must. Tree remarkably vigorous, strongly branched, spreading, open, round head, very productive, bears early; shoots stout, dark; foliage rather scarce, somewhat curled and apparently covered with a bluish grey bloom.

Golden Pearmain. Very good for the table, Dec. to Feb. Medium size, roundish, conical, lopsided, truncated, yellow, blushed, russeted, orange in the sun; basin abrupt, wide, regular; eye large, open; cavity acute, regular; stem slender, short to medium; core somewhat open; seeds plump and imperfect; flesh yellow, breaking, fine-grained, acid, aromatic, sprightly. Other apples are described under this name. Tree vigorous but tardy and shy in bearing.

Golden Pippin, *York Pippin*, *Pound Royal*, *Mammoth*, etc. Very large, sometimes weighing 20 ounces, roundish, ribbed, greenish yellow, becoming quite yellow at full maturity, slight blush of brown crimson in sun-exposed specimens; flesh yellowish, coarse, juicy, tender, mild subacid; core small; good to very good, Nov. and Dec. Tree very productive and vigorous on deep, rich soil. Two other noteworthy apples are described under this name in the books.

Golden Russet. The variety of apple known under this name in the West, as well as under the name of Hunt Russet, English Golden Russet, New England Russet, we have described under the name of Hunt's Russet; but there is a Golden Russet of Western New York, quite distinct from the above, and is incorrectly called English Golden Russet by some at the West.

Golden Sweet, *Orange Sweeting*. Good to very good, for cooking and market, Aug. and Sept. Large, globular, regular, very smooth, waxen to rich yellow; dots scattered, indented, green; stem long, slender, yellow; cavity wide, regular; basin shallow, wide, regular; eye closed; calyx reflexed; core medium, regular, closed; seeds numerous, small, pointed, light brown; flesh yellow, breaking, fine-grained, juicy, very sweet, aromatic, like sassafras. Tree very robust, spreading, round head, early, productive; foliage large, dark.

Gravenstein. Best for cooking and market, Aug. and Sept. Large, slightly oblate, angular, smooth, yellow, partially covered with mixed and splashed scarlet; dots rare; basin medium, regular; eye small, closed; cavity deep, regular; stem short; core globular, closed, clasping the eye; seeds small, pointed; flesh yellow, fine-grained, breaking, juicy, subacid, aromatic. Tree spreading, vigorous and productive; leaves long, rolled, showing the white underside.

Green Cheese, *Green Crank*, *Southern Greening*, etc. Very good for table and market in Kentucky and Southwestern States, Dec. to Mar. Medium to large, somewhat flattened, conical, regular, green to yellow, sometimes bronzed; dots small, grey; basin medium, regular; eye medium, closed; cavity wide, acute, brown; stem medium, green, thick; core wide, closed, not clasping the eye; seeds numerous, plump, short, dark; flesh yellow, firm, fine-grained, juicy, subacid, aromatic, rich. Tree moderately thrifty; foliage small.

Green Newtown Pippin, *Newtown Pippin*, *Hunt's Fine Green Pippin*, etc. This is distinct from the common Newtown Pippin, which is yellow. Medium to large, globular, flattened, sometimes obscurely ribbed, smooth, green, becoming yellowish green when fully ripe, sometimes a little bronzed, and always showing white, irregular streaks near the base when first gathered; dots scattered, minute, dark; basin, shallow, folded; eye small, closed; cavity wide, wavy, brown; stem long, slender; seeds pointed, plump, dark; flesh greenish white, crisp, tender, acid, aromatic, rich, very agreeable. Best table and cooking, Dec. to March.

Grimes' Golden Pippin, *Grimes' Golden.* Very good to best, table and market, Dec. to Mar. Fair size, cylindrical, regular, yellow vein, russeted; dots numerous, minute; basin abrupt, folded; eye large, closed; cavity large, regular, green; stem long, curved; core small and pear-shaped; seeds numerous, plump, brown; flesh yellow, firm, breaking, very fine-grained, tender, juicy, subacid, aromatic, rich and refreshing. Tree healthy, spreading, productive, etc.; shoot stout, dark; foliage abundant, dark, green.

Grindstone, *American Pippin.* Good, keeping and market, April till June. Medium size, regular form, oblate, dull red in patches, and stripes on a dull green ground; flesh white, firm, juicy, with a somewhat brisk, acid flavor. Valuable only for its late keeping and for cider. Tree thrifty, spreading, with crooked shoots.

Haas. One of the hardiest apple-trees in Wisconsin. See Horse.

Hall, *Hall's Seedling*, *Hall's Red.* Almost best, table and market, South, Dec. to Apr. Small, round, slightly conical, regular, smooth, yellow, covered with bright red, mixed and striped; dots numerous, large, yellow; basin shallow, wavy, oblate, leather-cracked; eye small, closed; cavity wide, regular, brown; stem long, slender; core pear-shaped, regular, slightly open; seeds large; flesh yellow, tender, fine-grained, juicy, subacid, rich, agreeable. Tree medium size, thrifty, etc.; shoots long, rather slender, reddish.

Harrison. Good, cooking and dessert, in April, and cider. Small, round conical, somewhat angular and irregular, not smooth, yellow, rarely blushed, frequent rose-colored spots, and marks radiating from the cavity over the base of the fruit; dots small, distinct, grey; basin none, or very shallow, plaited; eye small, closed; stem long, red, knobby; core heart-shaped, closed; seeds numerous, small; flesh yellow, compact, dry till ripe, then juicy, acid, very rich, saccharine. Tree spreading, large, vigorous and productive.

Haskell Sweet. Very good to best, for table, Aug. to Oct. Large, flat, regular, green, bronzy; dots numerous, large, white; basin deep; eye small, closed; cavity deep, wavy; stem short; core closed; seeds numerous, plump; flesh yellow, juicy, sweet, rich.

Hawley. Aug. and Sept.; good, but soon decays. Large, oblate or slightly conic, waxy yellow, rather shaded or blushed, becomes greasy when kept; basin wide, wavy; cavity wide, sometimes folded; stem various; core closed; seeds generally imperfect; flesh yellowish white, very tender, fine-grained, juicy, very pleasant, mild subacid, rich. Tree has a round, spreading head; shoots stout, olive.

Higby's Sweet, *Lady's Blush*, *Lady Cheek Sweet.* Good for cooking, Oct. Large, round, truncated, regular, smooth, greenish yellow, blushed; dots scattered, distinct, white and dark; basin abrupt, deep, wavy; eye medium, closed; cavity deep, acute, regular, brown; core small, heart-shaped, closed; flesh yellowish white, tender, fine-grained, juicy, very sweet. Tree an upright grower and early and good bearer; young shoots very short jointed with a few light specks.

High-top Sweet, *Sweet June*, *Summer Sweet.* Good, cooking and market, June to Aug. Small to medium, round, regular, smooth, greenish yellow; dots minute, black; basin medium, regular; eye small, closed; cavity deep, narrow; stem medium; core very small, oval; seeds numerous, angular, yellow; flesh white or greenish white, fine-grained, tender, sweet, juicy. Tree exceedingly productive and profitable.

Horse, *Summer Horse*, *Haas*, *Yellow Hoss.* Good, market and cooking, South, last of July and first of Aug. Large, round, somewhat conical, truncated, uneven, yellow, sometimes tinged with red and small patches of russet; dots scattering, indented, large, grey and greenish; basin abrupt, folded; eye medium, closed; cavity deep, acute, wavy, brown; stem medium to long; core large, somewhat open; seeds numerous, brown; flesh yellow, crisp, juicy, pleasant subacid. Tree an annual and abundant bearer; young wood, light reddish brown.

Hubbardston Nonsuch, *Hubbardston*, *Old-Town Pippin.* Very good, table and market, Oct. to Jan. Large, handsome, round, somewhat ovate, regular, uneven yellow, covered with mixed red and broken stripes, presenting a rich brownish appearance; dots scattered, grey, prominent; basin abrupt, wide, regular, leather-cracked or russeted, or both; eye medium or small, open; cavity wide, regular, brown; stem medium or short; core large, heart-shaped, regular, sometimes partially open; seeds few, pointed; flesh yellow, juicy, tender, fine-grained, crisp. Tree has all good qualities; leaves round; young shoots dull, greyish brown.

Hunt's Russet. Very good to best for table, Jan. to Apr. Small, roundish, oblate, yellow, mostly covered with thin, dull russet, with a blush of bright, rich red in the sun; cavity large, deep, acute; basin slightly corrugated; flesh yellowish white, fine-grained, tender, juicy, rich, brisk, subacid, slightly aromatic. Tree hardy, upright, spreading, an annual and good bearer.

Isham Sweet. A fine, large variety.

Janneting: see Rawle's Janet.

Jersey Sweeting, *Jersey Sweet.* Very good, table and market, Aug. to Oct. Medium size, regular, globular-oblate, sometimes rather conical, smooth, yellow, nearly covered with red, mixed, striped and splashed carmine; dots minute; basin medium to wide, regular; eye small, generally closed; cavity wide, regular or wavy, rather deep; stem medium to long, green; core wide, regular, generally closed; seeds numerous, wide; flesh pale yellow, tender, fine-grained, juicy, very sweet and rich. Valuable also for baking and for feeding stock. Tree round-headed; shoots short, jointed and red; foliage abundant.

Jonathan. Best, dessert, cooking and market, Dec. to Jan. Medium size, round or oblong, conic, truncated, regular, smooth, waxy yellow ground but nearly covered with brilliant dark red, mixed and striped; dots minute, russet-veined; basin deep, regular; eye small, closed, green; cavity acute, deep, regular, reddish brown; stem long, slender; core medium, oval, closed; seeds numerous, large, angular; flesh whitish yellow, tender, breaking, very juicy, subacid, aromatic, equal to a Spitzenburg; a beautiful apple and should be in every orchard. Tree of slender growth, spreading, rather drooping, productive; shoots slender; buds small; foliage rather sparse, greyish.

Kentucky Sweet. Good to best, market, baking and stock, Nov. to Jan. Medium size, conic, smooth, deep red, stripes scarcely visible, the yellow ground rarely seen; dots scattered, large, yellow; basin narrow, leather-cracked; eye long, open; cavity acute, brown; core somewhat open; seeds numerous, large, imperfect, brown; flesh yellow, tender, fine-grained, juicy, very sweet, rich, slightly perfumed.

Keswick Codlin. Good, market and cooking, Aug. to Oct. Medium size, oblong, conical, truncated, ribbed, smooth, pale yellow; dots scattered, minute; basin medium, folded; eye medium to large, closed; cavity acute, regular, brown; stem long, yellow; core large, open; seeds numerous, angular; flesh greenish yellow, fine-grained, tender, juicy, acid. Tree an early bearer, hardy and productive; shoots branching in a peculiar manner, and are of a dark color.

King of Tompkins County, *King*, *Tommy Red.* Best, table, cooking and market, winter. Large, handsome, globular, irregular, angular, smooth yellow ground, covered with deep red, marbled and striped; dots numerous, grey, large; basin shallow, folded; eye large, short, closed; cavity wide, shallow, wavy; stem various, red; core very large, closed; seeds imperfect, angular; flesh yellowish white, tender, crisp, subacid, aromatic. Tree an abundant annual bearer; shoots very downy.

Klaproth. Good, table and market, Aug. to Oct. Medium size, regular, oblate, dull yellow, more or less covered with red stripes; dots numerous, light; basin wide, regular; eye closed, small;

cavity deep, regular, brown; stem short to medium; flesh white, crisp, tender, juicy, acid. Tree has all the good qualities; shoots a greyish brown.

Lady, *Api*, etc. Good for ornament, dessert and market. Very small, flat, regular, smooth, polished, pale waxen-yellow ground, nearly covered with bright carmine; a beautiful apple; basin rather abrupt; cavity acute; stem short; core wide, closed; seeds numerous; flesh white, crisp, tender and juicy, mild subacid. Dec. to Mar. Tree of medium size, very close and upright, healthy and productive; shoots very dark; foliage small, crowded, curled and very dark.

Lady's Sweeting, *Lady's Sweet.* Good to best, table, baking, market and stock feeding, Dec. to May. Large, round, somewhat conic, occasionally angular, smooth, light yellow, striped and splashed with red; dots distinct, large, grey; basin medium, often abrupt, folded; eye very small, closed; cavity medium or wide, regular, brown; stem various; core medium size, otherwise various; seeds angular and 16 in number; flesh white, crisp, fine-grained, juicy, sweet, agreeable. Tree thrifty and productive.

Large Bough, *Large Yellow Bough*, *Early Sweet Bough*, *Sweet Harvest.* Good to best, for table and market, July and Aug. Rather large, round, conic, regular, very light, smooth, white or pale yellow, dots few, minute, dark, indented; basin shallow, regular; eye small, closed; cavity deep, regular, sometimes brown; core regular, nearly closed; seeds medium, dark; flesh white, very soft, light, juicy, very sweet when ripe, somewhat bitter when green, rather flavorless when cooked, but too sweet for pies and sauce. Tree has a compact head and is rather productive; young shoots greyish brown, very slightly downy.

Late Strawberry, *Autumn Strawberry.* Best, table and market, Sept. to Dec. Medium size, roundish, conical, angular, furrowed, smooth waxen yellow, mixed and striped scarlet; dots minute, indented; basin folded, irregular; eye closed; cavity acute, wavy, irregular; stem slender, long; core medium, closed; seeds large; flesh yellow, very tender, fine-grained, very juicy, subacid, aromatic, vinous, refreshing. Tree upright, thrifty, etc.

Limber Twig. Good or very good, dessert and cooking, Jan. to April. Small, roundish, conic, rather smooth, mixed, dull purplish red on green ground, stripes scarcely to be traced; dots numerous, large, irregular, brown; eye small, open; cavity deep, brown; stem curved; core rather large, turbinate, closed; seeds numerous, small, plump, long; flesh greenish yellow, firm, subacid, rich, aromatic. Keeps very well in the ground, but wilts if exposed to the air. Tree thrifty and exceedingly productive; shoots slender and drooping with the heavy crops.

Lowell, *Greasy or Tallow Pippin*, *Queen Anne*, *Michigan Golden*, etc. Very good, market and cooking, Aug. to Oct. Large, round, slightly conic, truncated, regular, smooth, waxy yellow, not blushed or bronzed, becoming greasy when kept in-doors; dots numerous, green; basin deep, abrupt, regular; eye medium, closed; cavity medium, regular, green; stem long, slender; core medium, oval, closed; seeds numerous, angular, pointed, pale; flesh yellow, tender, fine-grained, juicy, subacid, aromatic.

McIntosh's Red is a new good variety.

McLellan. Very good, table, Dec. to March. Medium size or above, roundish, regular, fair, yellow, mostly striped, marbled and splashed with red; stem short; cavity deep; calyx nearly closed; basin moderate, slightly uneven; flesh white, very tender, juicy, with a fine vinous flavor, almost sugary. Tree handsome and good otherwise. Not much raised in the West.

Maiden's Blush. Very good, table, cooking and market, Aug. to Oct. Medium size to large, regular, flat, smooth, polished, pale waxen yellow blushed with bright carmine, and is a very handsome apple; dots minute; basin shallow, regular or wavy; eye small, closed; cavity wide, wavy; stem medium to short; core closed; seeds numerous, brown; flesh white, crisp, fine-grained, juicy, acid, aromatic. In drying it retains a very light color. Tree has all the good qualities.

Melon, *Watermelon.* Very good, table, cooking and market, Nov. to March. Large, oblate, somewhat conical, angular, smooth, waxen yellow, nearly covered with marbled and mixed scarlet, striped distinctly with darker shade; dots minute; basin wide; eye open; cavity deep, acute, wavy, green and brown; core heart-shaped, wide, partially open; seeds numerous, angular; flesh yellow, fine grained, tender, juicy, subacid, aromatic, rich. Tree round-headed, spreading, vigorous.

Michigan Golden. This is treated by Dr. Warder as a distinct variety from the Lowell, although his description is about the same. In quality he gives it as nearly best, and extends its season for use to November.

Monmouth Pippin, *Red Cheek.* Very good, cooking and market, Dec. to March. Rather large, handsome, roundish or flattened, regular, smooth, greenish yellow, blushed and marbled; dots minute, green; basin shallow, regular; eye large, closed; cavity wide, regular or wavy, brown; stem short, thick; core medium, closed; seeds numerous, pointed, brown; flesh white, crisp, fine-grained, juicy, acid. Tree of moderate, upright growth; young shoots dark olive.

Milam. Good as dessert, Dec. to March. Small, smooth, yellow, covered with marbled-red indistinct stripes; dots small, grey, scattered, prominent; basin narrow, wavy, leather-cracked; cavity acute, brown; stem long; core ovate, closed; seeds numerous, some imperfect; flesh white, tender, crisp, juicy, mild subacid or sweet; agreeable and refreshing. Tree round-headed, twiggy; foliage rather dark; shoots reddish; annually productive and an early bearer.

Minkler, *Brandywine.* Good, market and cooking, Jan. to May. Medium to large, globular, smooth, greenish yellow, covered with mixed red and stripes of dark, dull red; dots scattered, minute, yellow; basin wide; cavity acute, brown; core large, closed; seeds numerous, long, pointed; flesh yellow or greenish yellow, fine-grained, breaking, juicy, subacid. Tree thrifty, spreading; branches strong. The Brandywine found at Quincy, Ill., is probably a distinct apple.

Montebello. Very good, Sept. to Nov. Above medium, oblate, pale yellow, shaded and mottled with light red, striped and splashed with dark rich red over the whole surface, and a few large, light dots; stem very short, small; cavity large, russeted; eye small, nearly closed; basin large, deep, smooth; core small or medium, and very short; flesh quite white, fine, sometimes a little stained next to the skin, very tender, juicy, mild subacid, vinous. Tree upright, hardy, healthy, an early bearer, very productive annually.

Mother. Best, table, Oct. to Jan. Medium size, oblong, regular, smooth, shaded red on yellow, with close, fine stripes of red; dots minute; basin regular or plaited; eye long, small, closed; seeds numerous; flesh yellow, crisp, very fine-grained, juicy, sweet, very rich, vinous, aromatic. Tree rather slender but productive.

Mountain Sweet. Good to very good, table and cooking, Dec. A rival of Broadwell or Lady's Sweeting. Large, beautiful, but too delicate for transportation, oblate, smooth, light yellow; dots minute; basin wide, wavy; eye small, closed; cavity deep, wavy; stem short, slender; core wide, open, dark; seeds numerous, pointed; flesh white, crisp, very tender, fine-grained, juicy, sweet.

Newtown Pippin. See Green and Yellow Newtown Pippin.

Newtown Spitzenburg, *Vandevere*, *Spiced Ox-Eye*, etc. Best, table, cooking and market, Oct. to Feb. Medium size to large, regular, globular-oblate, often lop-sided, scabby and defective on old trees and falls badly, smooth, deep red, mixed and striped, on rich, yellow ground, often overspread with whitish, giving the fruit a grey appearance; dots numerous, minute; fawn color on dark specimens; basin medium, regular; eye small, closed; cavity regular, medium, brown; stem short; core regular, wide, somewhat open; seeds numerous, angular; flesh rich, yellow, very fine-grained, very tender, juicy, rich subacid and saccharine, aromatic, and eminently satisfying. Tree not very large, compact, round head, productive; foliage rather small, curled, showing the white underneath.

Nickajack, *Summerour*, *Jackson Red*, *Big Hill*, *Carolina Spice*, *Cheatan Pippin*, *Red Warrior*, *World's Wonder*, *Missouri Red*, and many other names. Good, market and keeper, Dec. to May. Rather Southern, large, nearly round, not handsome, even but not smooth, mostly covered with brick-dust red, striped indistinctly with dark red, some stripes very distinct; dots scattered, yellow; basin shallow, even; eye small, closed; cavity acute, regular, yellow and brown; stem slender; core closed; seeds numerous, large; flesh greenish yellow, crisp, firm, coarse, subacid, not rich. Tree robust, spreading, large, very productive; shoots stout and red.

Northern Spy. Very good to best, Dec. to June. Table, cooking and market. Large, flattened, conical, angular, smooth, yellow, mixed and splashed scarlet or crimson; dots scattered, small; basin abrupt, regular or folded; eye small, closed; cavity wide, regular or wavy brown; stem medium to short; core large, irregular, open; seeds numerous, small, pointed, pale; flesh yellowish, white, crisp, granular, juicy, acid, aromatic, rich, with the spiciness of a Spitzenburg. Tree vigorous, large, upright, and when older, spreading and very productive; needs much trimming; shoots reddish; leaves, healthy, large, dark.

Ohio Nonpareil, *Myer's Nonpareil*, *Western Beauty.* Very good to best, table and market, Sept. to Dec. Large to very large, regular, oblate, smooth, yellow, covered with bright red, very handsome; dots scattered, grey; basin wide, regular; eye large, closed; cavity deep, regular; stem short, small; core somewhat open; seeds numerous; flesh yellowish, tender, fine-grained, juicy, subacid, rich. Tree healthy, etc., limbs straight, stout, compact.

Peach Pond Sweet. Very good, table, cooking and market, Sept. to Nov. Small to medium, round, oblate, five-angled, slightly conical, smooth, pale yellow, lightly covered with mixed and striped red, beautifully splashed crimson; basin narrow or folded; eye small, closed; cavity deep, acute, brown; stem medium to long, green, sometimes knobby; core regular, heart-shaped, closed; seeds small, short; flesh yellow, tender, fine-grained, juicy, very sweet. Tree spreading; shoots dull, grayish brown.

Peck's Pleasant. Very good, to best, table, cooking and market, Nov. to March. Large, flattened, globular, somewhat angular, sometimes having a shallow furrow on one side, smooth, yellow or orange, sometimes faintly blushed; dots grey with white basis; basin rather shallow and folded; eye small and open; cavity wide but often lipped brown; stem short, very thick and knobby;

core large, closed; seeds numerous, angular; flesh yellow, tender, crisp, fine-grained, subacid, somewhat aromatic. Tree spreading moderately, vigorous, and a regular bearer.

Penock, *Red Ox*, *Large or Big Romanite.* Poor, Nov. to March. Very large, form variable, but generally roundish; often unequal and lopsided, greenish yellow, covered with mixed and striped red; dots large, irregular and grey; basin wide, deep, uneven; eye open; cavity wide, deep; stem short; seeds numerous, angular; flesh yellow, breaking, coarse grain, subacid; very much disposed to bitter rot. Tree large, spreading, very productive, bearing annually.

Perry Russet. Very good, table and cooking, Nov. to Jan. Medium to large, oblate, regular, smooth, yellow, covered with fine russet; dots minute, scattered; basin medium, wavy; eye large, closed; cavity regular or wavy brown; stem medium; core small, closed; seeds few; flesh yellow, fine-grained, juicy, acid, rich. Tree a moderate, upright, spreading grower, hardy, an early and abundant bearer; young shoots light brownish red.

Pomme Grise, *Gray Apple.* Good to best, for dessert and market, Dec. to March. Small, roundish, oblate, regular, even, not quite smooth, yellow, overspread with fine russet, rarely blushed; basin wide, sometimes abrupt; eye very small, closed; cavity wide; stem short or medium; core heart-shaped, full, regular, closed; seeds plump, angular; flesh firm, yellow, crisp, fine-grained, juicy, subacid, rich, aromatic, delicious. Tree good; shoots slender.

Primate, *Rough and Ready*, *Sour Harvest*, *July Apple*, etc. Very good to best, table, Aug. to Oct. Fair size, globular, angular, irregular, smooth, greenish yellow, becoming almost white, sometimes faintly blushed; basin abrupt, folded; eye small, long, closed; cavity acute, wavy green; stem medium to long, thick; core closed; seeds numerous, angular, long, dark; flesh greenish white, very tender, fine-grained, mild subacid, agreeable. Tree stocky and productive; shoots stout, short, light olive; buds prominent; foliage pale green.

Porter. Very good to best, table and market, Aug. to Oct. Rather large, oblong, somewhat conic, often truncated, smooth, yellow, often faintly blushed; dots few, sunken; basin abrupt, folded; eye large, closed; cavity acute, wavy brown; core closed; seeds numerous; flesh yellowish white, crisp, tender, juicy, acid. An Eastern apple.

Pewaukee. Good, Jan. to May. Medium to large, roundish, oblate, bright yellow, striped, splashed and mottled with light and dark red over most of the surface, covered with a thin greyish bloom; dots both large and small, numerous; stem short, small; cavity small; eye closed; basin slightly corrugated; flesh white, crisp, a little coarse, half tender, juicy, subacid, slightly aromatic; core small. Tree strong, upright, spreading, an annual bearer, and Wisconsin is its home.

Pryor's Red, *Big Hill.* Very good, or best, table, cooking and market, South and Southwest, Dec. to Mar. Large, globular, oblate, often unequal, greenish or dull, red striped, russeted; dots numerous, large, grey; basin shallow, regular or plaited, leather-cracked; eye small, closed; cavity shallow, acute, often lipped; core regular, closed; seeds numerous, angular, pointed; flesh yellow, tender, melting, fine-grained, juicy, subacid, rich. Tree large, twiggy, productive when old; shoots slender, reddish, olive, speckled; foliage scattering, folded, greyish green, subject to blight.

Plumb's Cider. Sept to Jan. Medium size, roundish, slightly conic, greenish yellow, shaded and rather obscurely striped and splashed with dull red; some light dots; stem short, small; cavity small; eye small, closed; basin small, corrugated; flesh whitish, half fine, tender, juicy, mild subacid; core small. The tree is round-headed, an early bearer, and very productive alternate years. It is one of the most profitable apples in Wisconsin.

Quince, or *Cole's Quince.* Very good, Oct. to Dec. Medium to large, brownish, oblate, yellow, rarely with a blush, somewhat broadly ribbed; stem short; cavity open, deep; eye closed; basin large, deep, uneven; flesh yellowish white, crisp, tender, a little coarse, with a brisk, pleasant subacid, quince aroma; core large. Young wood, a clear, rich reddish brown, with short, abrupt, prominent buds.

Ramsdell's Sweet, *Ramsdell's Red*, *Red Pumpkin Sweet*, *English Sweet*, etc. Very good, cooking and for stock, Sept. to Feb. Medium to large, oblong, regular truncated, smooth, yellow, ground hidden by bright or dark red, mixed and striped; dots numerous, fawn-colored, and covered with a bluish bloom; basin deep, abrupt, wavy; eye small, closed; cavity deep, wavy; stem medium to long, often red; core large, closed; seeds large; flesh yellow, crisp, juicy, very sweet and rich. Tree upright, many branches, an early bearer; shoots slender, reddish; foliage light green.

Rambo, *Romanite*, *Bread and Cheese*, *Seek-no-further*, etc. Best, dessert, cooking and market, Oct. to Dec. Small to medium, regular, oblate, sometimes unequal when overgrown; large specimens appear truncate, striped and splashed, scarlet on greenish yellow, in some the stripes coalesce; dots numerous, small, prominent, rich bloom; basin wide, abrupt, regular or plaited, sometimes quite shallow; eye small, closed; cavity wide, always green; core closed; seeds numerous, large, angular; flesh greenish white, tender, crisp, granular, juicy, subacid, aromatic, vinous. Tree upright, thrifty, productive; shoots dark; foliage large, light green.

Rawle's Janet, *Missouri Jannetting*, *Red Never-Fail*, *Rock Rimmon*, etc. Good to very good, table, market, keeper and cider, Southwest, Feb. to June. Medium size, flattened, conic, regular, smooth, mixed and striped crimson on yellow and green; dots many, small; eye small, closed; cavity deep and brown; stem long, curved; core heart-shaped, closed; seeds many; flesh yellowish, crisp, fine-grained, juicy, subacid, vinous, refreshing. Tree thrifty, not large, spreading; twigs brownish; foliage rather whitish; blossoms late. Grows and matures in Missouri far better than anywhere else.

Red Astrachan. First-rate, market and table, July and Aug. Medium to large, regular, oblate, smooth, mottled, marbled and striped crimson on greenish yellow; dots minute, with heavy bloom; basin regular; eye small, closed; cavity shallow; stem long, yellow; core closed; seeds angular, small, dark; flesh yellow, crisp, juicy, sour, not rich. Tree vigorous and productive; shoots reddish brown; foliage large, rich green.

Red Canada, *Steele's Red.* Best table and market, Dec. to May. Medium size, globular, conic, indistinctly angular, smooth, yellow, covered with mixed and striped bright red; dots numerous, grey, indented, elongated near the stem; basin shallow, folded; eye small, closed; cavity wide, acute, wavy; stem long, inclined; core large, closed; seeds imperfect; flesh yellowish white, crisp, tender, fine-grained, juicy, subacid, aromatic, delicious. Tree slender, twiggy, but healthy and productive; young wood brownish olive.

Red Queening, *Red Queen*, *Crimson Queening*, etc. Good in the West, Dec. to March. Medium size, conical, mostly covered with deep crimson; flesh white, with a red tinge under the skin; tender, juicy, sweet, aromatic.

Rhode Island Greening. Almost best, cooking and market, Oct. to March. Large, globular, sometimes flattish, smooth in the North, somewhat rough and often quite russeted in the South, a dull green becoming yellow at maturity; dots grey, irregular, numerous; basin somewhat russeted; eye small to medium, closed; cavity wide; stem medium to long, curved, often reddish; flesh very yellow, crisp, tender, juicy, rich, acid; seeds numerous, angular, dark. Tree very vigorous, crooked, spreading, productive; shoots stout, dark; foliage dark.

Ribston Pippin. An extra good apple in England; good in Maine and Canada. Cooking and market, Nov. to Feb. Medium to large, round, truncated, rough, splashed and mixed dull on yellow; prominent russet dots, small but numerous; basin abrupt, russeted; eye small, closed; cavity acute, wide, brown; stem slender; core closed; seeds numerous, angular, imperfect; flesh yellow, crisp, firm, juicy, acid, rich, aromatic.

Rice's Sweet is a good apple for the West.

Roman Stem. Good to very good, dessert, Nov. to March. Medium size, globular, smooth, yellow, often blushed; dots minute, reddish or dark; basin shallow, wavy, russet; eye small, closed; cavity acute, lipped; stem long; core large, hollow, heart-shaped; seeds numerous; flesh yellowish white, fine-grained, juicy, mild subacid, rich. Tree productive, spreading irregular; moderately vigorous.

Rome Beauty, *Gillet's Seedling.* Good, Oct. to Feb. Market, large, regular, fair, handsome, roundish, oblate, sometimes rather conical, smooth, pale yellow, striped, mixed, bright red; dots minute, indented; basin wide, deep; eye very small; cavity wide, wavy, green; stem long, slender; core wide, closed; seeds numerous, long, pointed; flesh yellow, breaking, coarse grained, subacid, not rich. Tree hardy, round-headed, very productive; shoots slender or red; foliage healthy; blossoms late.

Roxbury Russet, *Boston*, *Putnam*, etc., *Russet.* Good to very good, Nov. to June. Table and market. Medium size, sometimes large, roundish, a little flattened, dull green, but when ripe covered with brownish yellow, russet, sometimes with a faint blush on one side; stem slender, curved; cavity pointed; basin regular, or wavy, green, often folded; core closed; seeds numerous, angular, imperfect; flesh greenish yellow, breaking, granular, often coarse, juicy, decidedly acid. Tree robust, spreading; shoots stout, straggling, dark; foliage greyish-green.

Salome. Best, dessert and cooking, in the spring. Uniform, large, fair size, and cling tightly to the tree; flesh juicy, a peculiar subacid, slightly spicy flavor; color yellow, nearly overspread with red. The tree is an early and abundant bearer, producing annually; leaves very thick and stout. Originated by E. C. Hatheway, of Ottawa, Ill.

Seek-no-Further. The apple which, by this name, flourishes in the Northwestern States, is the Westfield Seek-no-Further, which see.

Smith's Cider, *Smith's*, *Pennsylvania Cider.* Good for cooking and cider Dec. to Mar. Medium to large, round, flat to elongated, sometimes lopsided, smooth, pale yellow covered with mixed light red, splashed indistinctly with bright carmine, beautiful; dots indistinct, rather large, light grey; basin shallow, often plaited; cavity acute, brown; stem variable; core wide, pear-shaped, open; seeds numerous, pointed; flesh white, breaking, juicy, acid, aromatic, peculiar, not rich. Tree vigorous, etc., and an early bearer; limbs straggling; shoots slender, light olive; foliage large, light green.

Sops of Wine. Good for dessert, Aug. and Sept. Small to medium, round, slightly conic, regular, smooth, mixed red, shaded dark red throughout; dots small, yellow; basin shallow, plaited; cavity somewhat wavy; stem long, red; core distinctly marked with a red line, wide, oval, closed; seeds numerous, brown; flesh yellow, fine-grained, tender, juicy, acid, agreeable. Tree spreading, productive, upright.

Stanard, *Stanard's Seedling*. Good, market and table, Nov. to Mar. Large, roundish, ribbed, angular, smooth, yellowish green, somewhat red, mixed and striped indistinctly; dots numerous, minute, white; basin folded; eye large, closed; cavity wide, acute, wavy, green; core small, closed; seeds numerous, brown, angular; flesh yellow, breaking, rather coarse, tender, acid, rich. Tree spreading, generally crooked; buds large. Becoming a popular apple in the West.

St. Lawrence. Good to very good, Sept. and Oct. Large, oblate, yellowish, striped and splashed carmine; cavity large; basin small, deep; flesh white, lightly stained, crisp, juicy, tender, vinous. Tree vigorous, upright, productive; young shoots smooth.

Striped Winter Pearmain, *Large Striped Winter Pearmain*, *Striped Sweet Pippin*. Very good, market, cooking, table, Oct. to Feb. Large, round, flattened, regular, fair, handsome, smooth, mixed, splashed and striped pale purplish red on yellow; dots minute, indented, grey, so that the fruit has a general grey appearance; basin regular, sometimes cracked; eye small, closed; cavity wide, wavy brown; stem various; core open; seeds numerous, large, angular, some imperfect; flesh yellow, breaking, coarse-grained, juicy, subacid. Tree spreading, thrifty, productive; shoots rather slender, dark; foliage dark green.

Summer Pippin, *Sour Bough*, *Large Golden Pippin*, etc. Good, cooking and market, Aug. and Sept. Medium to large, variable in form, pale waxen yellow shaded with a delicate crimson blush and sprinkled with green and greyish dots; stem variable; cavity deep, abrupt; basin deep, abrupt, folded; eye closed; flesh white, tender, moderately juicy, subacid, refreshing. Tree has a beautiful head and is a good bearer.

Summer Queen. First-rate, cooking and market, July to Sept. Medium-sized, round, conic, angular, yellow covered with mixed red, striped, splashed scarlet; dots minute, yellow; basin none or very shallow, folded or plaited; eye medium, closed; cavity wide, brown; stem long, slender; core open; seeds numerous; flesh firm, yellow, breaking, acid, aromatic. Tree large, spreading, productive and vigorous.

Summer Rose. Very good or best, June to Aug.; dessert, cooking. Small, roundish, flattened, polished, very pale yellow striped and splashed distinctly with bright red and carmine; basin abrupt, wide; cavity regular; core large, closed; seeds numerous, short; flesh white, crisp, fine-grained, juicy, subacid, not rich, but agreeable; ripens gradually. Tree spreading, productive, and early bearer; shoots stout; foliage large, with bluish mealy luster.

Swaar. Very good to best, Dec. to Mar.; dessert and cooking. Large, variable form but generally roundish, somewhat flattened on the sides as well as vertically; not smooth; greenish yellow bronzed, becoming a dead golden yellow when ripe; dots large, numerous; basin medium, wide; eye small, not long, closed; cavity wide, regular or wavy green; stem long, curved, stout; core heart-shaped, closed; seeds numerous, angular, pale; flesh very heavy (whence its name, Swaar, which is Dutch for heavy), yellow, fine-grained, very mild subacid or sweet, very rich. Tree spreading, vigorous and productive; shoots stout, dark; foliage large, curled.

Sweet June. See High-top Sweet.

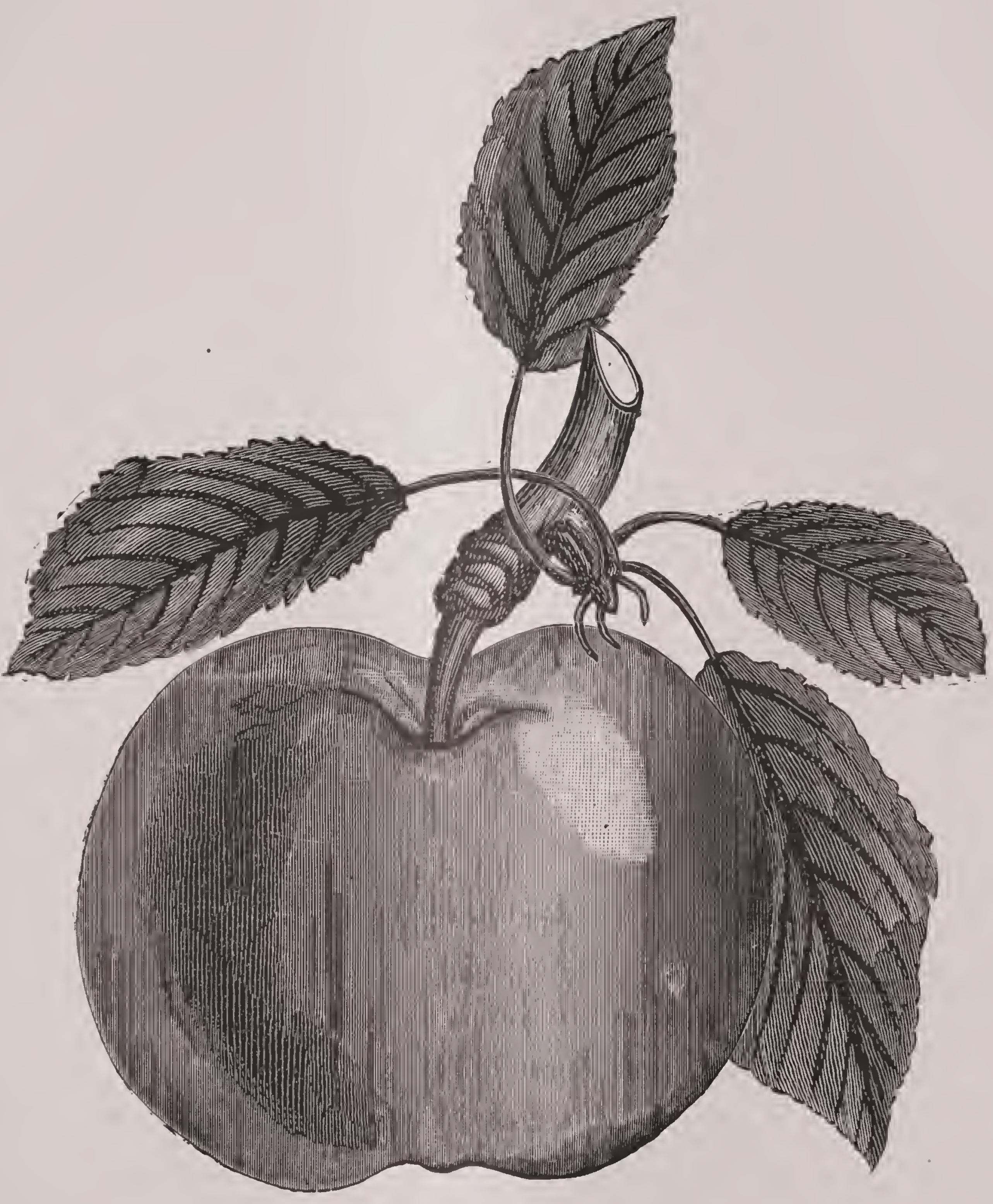
Sweet Romanite. Good to very good, baking, cider, table and stock, Dec. to Apr. Medium size, round, sometimes flattened, smooth, greenish yellow, blushed, mixed bright red and dull red, stripes indistinct; cavity deep, wavy, brown; stem medium to long, green; seeds numerous, angular; flesh yellow, fine-grained, breaking, juicy, very sweet; core small. Tree strong, upright, a moderate bearer.

Tetofsky, *Tetofski*. Good, cooking and market, June to July. Small to medium, round, flattened, somewhat conic, angular, smooth, yellow striped, splashed carmine, white bloom; basin shallow, folded; eye large, closed; cavity wide, wavy or deep, acute; stem short, yellow; core large, closed; seeds numerous, brown; flesh yellowish white, breaking, fine-grained, juicy, acid. Tree upright, hardy and productive; leaves broad, pale or light green.

Tewkesbury Winter Blush. Good, table, market, and keeping, from Jan. to July. Has more juice and flavor than any other long-keeping variety. Small, regular, flat, smooth, yellow blushed; flesh yellow, breaking, juicy, well-flavored. Tree has all the good qualities.

Trenton Early. Very good, dessert and cooking, Aug. and Sept. Large, conical, angular, smooth, very pale yellow or white; dots rare, minute; basin narrow, folded; eye small, closed; cavity wide, regular, brown; core large, rather open; seeds numerous, angular; flesh white, very tender, juicy, subacid, pleasant. Tree an abundant bearer, hardy, etc.

Talman's Sweet, *Tallman's Sweet*, *or Sweeting*, *or Tolman's Sweet*, etc. Good, market and cooking and stock, Nov. to Apr. Medium to large, nearly round, somewhat flattened, smooth, yellow; dots minute, dark; frequently a distinct line on one side from stem to eye; basin wide, leather-cracked; eye small, closed; cavity wide; stem



McINTOSH'S RED

long; core heart-shaped, closed; seeds numerous, dark; flesh yellow, breaking, firm, very sweet, rich. Tree upright, spreading, hardy and productive.

Triumph. Good, dessert and baking, in spring. Uniformly above medium size, regular, smooth, pale yellow, mostly covered with rather a dull red; flesh rich, subacid. Tree a seedling originated by J. W. Ridings, of Grundy county, Illinois.

Twenty Ounce, *Twenty Ounce Pippin*, *Cayuga Red Streak*, etc. Good, cooking and market, Oct. to Jan. Large, roundish, flat, greenish, more or less mottled and striped dull red; basin wide; eye open; cavity wide, green; stem short, thick; core large, closed; seeds numerous, large, angular; flesh yellowish white, breaking, acid, with a peculiar aroma not agreeable. Tree has a compact, neat head, bears regular crops, and the fruit is fair, handsome and showy.

Utter is a popular apple in some parts of the Northwest, the tree being hardy and a regular bearer. The fruit, which is best in early winter, is medium-sized to large, oblate, lemon-yellow ground, mottled, shaded and striped with light red; small russet dots; stem short and slender; basin open, furrowed; flesh white, tender, juicy, mild, pleasant subacid.

Wagener. Good, market, dessert and cooking, Nov. to Feb. Large, oblate, five-angled, very smooth, yellow, well covered with mixed bright red stripes not distinct; dots scattered, yellow; basin wide, abrupt; cavity brown; stem green; core heart-shaped, closed, wide; seeds numerous, large, angular; flesh yellowish white, tender, fine-grained, juicy, mild subacid. Tree a very early bearer, productive, etc., requires thinning.

Walbridge. See Edgar Redstreak.

Warfield. Good, Aug. to Nov., cooking. Medium size, roundish, oblate, light waxen-yellow, with a blush in the sun, moderately sprinkled with grey dots; stem slender; cavity slightly russeted; eye large, open; flesh whitish, moderately juicy, mild subacid; core small. Tree hardy, an early and abundant bearer. Originated in Muscatine, Iowa, and introduced by Suel Foster, of that place.

Wealthy. Very good, Dec. to Feb. Medium, oblate, whitish-yellow ground, shaded with deep crimson in the sun, obscure broken stripes, mottlings in the shade, sometimes entirely covered with crimson; many light dots; stem short to medium, slender; cavity green russet; basin deep, abrupt, uneven; flesh white, fine-grained, stained with red, tender, juicy, lively, vinous, subacid; core small; Tree hardy, vigorous, etc. Originated only about 20 years ago.

Westfield Seek-no-further, or simply *Seek-no-further.* Good to best, table and market, Oct. to Feb. Medium size, roundish, conic, smooth, dull red mixed and striped on yellow, in the North clear bright red; dots scattered, large, yellow; leather-cracked and russeted about the apex; basin shallow, leather-cracked; eye closed or open; cavity pointed, brown; stem long; core closed; seeds numerous, small, pointed; flesh yellowish white, tender, breaking, very mild subacid, aromatic, satisfying, not high-flavored or spicy. Tree vigorous, etc.

White, or *Canada Pippin.* Good, cooking and market, Dec. to March. Large, variable in form, angular, sometimes lopsided, generally fair and free from scab, smooth, green or greenish white to pale yellow when ripe; toward the base it is often marked, when unripe, with indistinct wavy stripes of white; the inter-spaces are sometimes colored by exposure and assume a dark or purplish hue, making the fruit appear to be striped; dots minute, and surrounded by green bases, which are most distinct just before the fruit is perfectly ripe; basin deep, abrupt, wavy or folded; eye small, closed; cavity wide, deep, wavy, brown and green; stem short, sometimes thick; core small, pear-shaped, closed; seeds numerous, angular, pale brown; flesh white, or yellowish white, breaking, granular, juicy, acid, not spicy; rather poor keeper. Tree remarkably thrifty; shoots dark, downy, bearing large leaves which are very downy beneath and deep green above.

Williams' Favorite, *Early* or *Red.* Good, market, July and Aug. Small, round, smooth, dark purplish red, indistinctly striped; dots none; basin abrupt, folded; cavity wide; stem long, slender; core large, closed; seeds pointed, brown; flesh whitish yellow, streaked red, breaking, not juicy, subacid, peculiar. Downing seems to describe a different apple under this name, saying that it is large and handsome and good for dessert, and that the tree is an abundant bearer.

White Winter Pearmain. Good to best, dessert, cooking, market, Dec. to March. Medium size to large, handsome when fair, but often scabby on rich limestone soils and on old trees, conical, sometimes obscurely angular, smooth, yellow, often bronzy; dots scattered, small, dark; basin abrupt, regular or shallow and folded; eye medium, closed; cavity acute, wavy, brown; stem medium to long, often knobby and clubbed; core closed; seeds few, pale or yellow; flesh yellow, fine-grained, tender, crisp, juicy, mild subacid, very rich. Tree spreading, productive, the bark often marked by a kind of canker or crack; foliage large, rather light green.

Willis Sweet. Good for all purposes, Aug. and Sept. Medium size, round, somewhat angular, striped red, very sweet and rich; flesh whitish, juicy, tender; core large.

Willow Twig, *Willow*, *James River.* Good, market and keeper, Dec. to April. Globular, truncated, somewhat oblong, medium size, light yellow, shaded and marbled with dull red, and sprinkled with numerous russet dots; basin wide, abrupt, plaited; stem long, slender, inclined; core round, closed; seeds numerous, brown; flesh greenish yellow, breaking, juicy, acid. Tree very vigorous, productive, etc., twiggy, thorny while young; shoots slender, olive brown.

Wine, Hay's Winter, Pennsylvania Red-streak. Good, cooking and market, Oct. to March. Large, globular-oblate, flattened or truncate, regular, sometimes unequal and lop-sided, smooth, yellow, more or less covered with broken stripes of red, splashed with crimson; dots scattered, large, grey; basin shallow, wide, abrupt; cavity acute, brown; flesh yellow, firm, breaking, juicy, acid, rich. Tree very large and handsome, spreading and very open head; leaves small, curled, mealy.

Winesap. Very good, cider, cooking, market. Medium size, conical, often obscurely angular or slightly ribbed, smooth, bright or dark red, mixed and obscurely striped on yellow, which is mostly covered, often veined russet; dots few, minute, indented; basin narrow, shallow, plaited; cavity wide, reddish brown; core somewhat open; seeds large, rather light; flesh firm, yellow, rich, acid. Tree vigorous, etc., an early bearer; branches open, straggling; foliage curled, bluish-mealy, sparse.

Winter Sweet Paradise. Very good, dessert, Nov. to March. Rather large, roundish-oblate, dull green when picked, with a brownish blush, becoming a little paler; stem short, often russeted; basin deep, slightly folded; flesh white, fine-grained, juicy, sweet, sprightly; core small. Tree hardy, etc., but not an early bearer; young shoots reddish grey.

Worthen Winter Sweet. This is a new apple, introduced by A. H. Worthen, Jr., near Warsaw, Ill., and bids for the highest public favor. The fruit has a very delicate color, and is beautiful. It is above the average size, of fine flavor, yellow, and keeps well.

Wythe. Good, Jan. to March. Medium size, oblate, slightly conic, nearly regular, white, shaded, striped and splashed over more than half the surface with bright red and a few light and grey dots; stem short, small; cavity large, deep; basin slightly plaited; flesh whitish, fine, tender, juicy, sprightly, subacid, slightly aromatic; core medium. Tree has round head, blooms rather late, bears good crops annually, of fruit of uniform size, which keeps well. This tree originated at Wythe, Ill., and is hardy and vigorous.

Yellow Bellflower, Belle Fleur, Lady Washington. Very good to best, dessert, cooking and market, Dec. to April. Large to very large, ovate, oblong, angular, ribbed, smooth, rich yellow, sometimes blushed; dots scattered, grey; basin plaited; cavity deep, wavy; stem long, curved; core large, oval, open; seeds dark, large, angular, imperfect; flesh yellow, breaking, fine-grained, juicy, acid to subacid, aromatic, very rich and satisfying. Tree vigorous, etc., spreading, drooping; twigs slender, brown; foliage abundant, long, wavy; blossoms very large and not protected by the leaves.

Yellow Newtown Pippin, Yellow Newtown. Best, dessert, cooking, market and cider, Feb. to May. Large, round, cylindrical, truncated, lop-sided, ribbed, sometimes even conic, smooth, yellowish green, sometimes bronzy, becoming yellow when ripe; marked with grey stripes near the base while green; dots minute, scattered, whitish bases; calyx open; basin large, folded, ribbed or plaited; cavity deep, brown; stem medium or short; core oval, closed; flesh yellow, firm, breaking, juicy, not crisp, acid, aromatic, rich, very agreeable. Tree of slow growth, not an early bearer, but large, spreading and productive.

SIBERIAN APPLE, called also Siberian Crab-apples, or simply "Crabs." This is a beautiful fruit and comparatively easy to raise, the principles of propagation and culture being the same as for the standard apple above treated, but it is more hardy. Some varieties are unequaled for preservation in different styles for dessert, and some are excellent for eating uncooked. They have the fine aroma of the wild crab, without the "crab"-bedness, and nothing can take their place. Some Siberians, under favorable circumstances, grow to the average size of standard apples.

VARIETIES. *Brier's Sweet* is a valuable Siberian apple, well adapted to Northern Illinois and Wisconsin; fruit as large as the Transcendent; shape like the Bailey Sweet; pale yellow, beautifully penciled and splashed with carmine; flesh yellowish, crisp, juicy, very sweet and rich. Tree vigorous and productive. This variety originated with B. B. Brier, of Baraboo, Wisconsin, and was the result of a fertilization of the Siberian crab with the Bailey apple.

Fay's Joe is a good crab-apple for the North-west.

Hyslop. Good for cooking and for cider. Large, produced in clusters, roundish ovate, dark, rich red, covered with a thick blue bloom; stem long, slender; flesh yellowish, subacid. Tree hardy, of strong growth, and rather spreading; young wood light colored and a little downy.

Lake Winter. One of the best in Wisconsin. Size medium to large, pale yellow, smooth, mostly covered with bright blush or stripes; cavity small; calyx closed in a shallow basin; core and seeds small; flesh fine-grained, firm, juicy, subacid, becoming nearly sweet in spring, entirely free from the crab taste; excellent for cooking and eating, from October to March. Tree a beautiful grower.

Milton. Also one of the best for the Northwest, but on rich lands has an irregular growth and tendency to blight.

Soulard. Very good, Oct. to Nov. Medium to large, oblate, obscurely ribbed, whitish, shaded, striped and splashed with light and dark bright red over most of the surface, with a few light and brown dots; stem small; cavity quite large, slight russet; basin corrugated.

Transcendent. This is one of the best of early autumn varieties. Fruit medium to large, roundish oblong, slightly but regularly ribbed, golden yellow, with a rich crimson-red cheek in the sun, covered with a delicate white bloom; stem long and slender, set in a deep cavity; eye closed; flesh creamy yellow, crisp, subacid, a little astringent until mellow, when it is pleasant and agreeable.

Whitney's No. 20 is a seedling raised and disseminated by A. R. Whitney, of Franklin Grove, Ill. The tree is symmetrical, and the fruit fully up to the Transcendent in size. For jellies the native crab is considered the best.

To Grind apples for cider and vinegar making on a large scale, there is manufactured a horse-power machine, represented by the annexed cut, which, with either one or two horses, does the work more thoroughly than any other machine we have examined. Many farmers lose about a quarter of the apple-juice, that would be saved by more perfect grinding. The price of this machine is only $25. Of course it can be run by any horse or steam power a man may have on his premises.

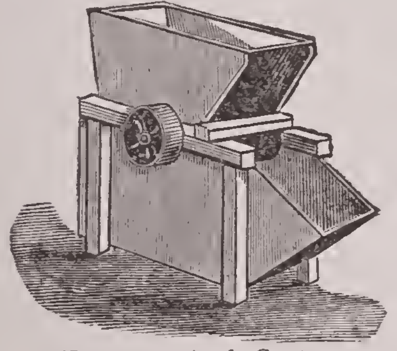


Fig. 20. *Apple Grater.*

Apples, to can and dry: see Canning and Drying.

Apple Pomace, ground apples from which the juice has been expressed, generally by a cider-mill. The pomace of ripe apples, after the cider is extracted, is valuable for almost any kind of jam. It is not as desirable for milch cows as for other kinds of stock, as it tends to make fat rather than milk. After cattle become accustomed to it, two pecks a day to each animal should be given. The same amount given to a horse, if he is not worked too hard, will fatten him. Pigs will readily eat it, and it appears to do them good. It is also good for poultry. If boiled and mixed with meal, it is readily eaten, and is quite as good if not better than potatoes. If spread in the hen-yard, the hens will pick out all of the seeds, which are really the most valuable portion of it. Sheep are very fond of it. In commencing to feed to any animal, only small quantities should be given at first, gradually increasing to the amount believed to be sufficient. Pomace spread several inches deep on a poor, gravelly hill, will bring in a good crop of clover the second year. And finally, when dried, it makes a hot fire. It is often used in steam cider-mills for fuel under the boilers. Whatever is intended for feeding purposes should not be left out in the sun and rain, to sour and decay, but should be housed and kept as sweet as possible. In hot weather it is very difficult to keep it, but when cool weather comes it can be kept for some weeks without fermenting enough to injure it. During warm weather it should be fed-out directly from the press, unless it is spread and dried. Every farmer who carries his apples to mill to grind for cider, should secure the privilege of carrying home, as wanted, as much pomace as his apples make, or as much as he has stock to consume; for the real value of the pomace is much more than the cider, if the apples are ripe.

Apple Butter, a sauce made of apples stewed down in cider. To make it, fill a preserving pan with peeled, quartered and cored apples; add cloves, allspice and cinnamon,— not too much; cover with good cider and boil slowly, mashing with a wooden spoon, until the whole becomes a dark brown jam, with no more juice than suffices to keep it soft and buttery.

Apple Jelly: see Jellies.

Apples, to pickle. First, wipe the skins smoothly, trim, and force the core out with a corer; put them in a deep dish, and steam them a little (not very soft); at the same time have ready the pickle, of which allow to one quart of good vinegar a cup of brown sugar, a tablespoonful of ground cinnamon, one teaspoonful of cloves (more if liked); simmer about five minutes, and pour over the fruit, hot. They may need scalding. For sweet apples, to eight pounds of fruit take three pounds of sugar and one quart of vinegar and one pound of raisins. This makes splendid sauce with either dried or green apples.

Apples, to bake. Most apples are good for baking, the acid sorts disintegrating into a fine pulp and broken skin, and the sweet shrinking down under a more leathery skin, forming a fig or raisin-like mass, with more or less of the juice expressed and evaporated down into a kind of molasses. Milk and cream can be used at the same meal with sweet apples, either raw or cooked, but with the acid apples milk coagulates or sours in such a way as to disagree with delicate stomachs: indeed, it is not perfectly healthful for any stomach. Baking is the most simple process of cooking apples, nothing special being required except to put in the pan just enough water to prevent burning. Acid apples should be watched and taken from the oven as soon as done (soft to the core), but sweet apples can remain in the oven an indefinite length of time, if the heat be not great enough to burn them. A very easily prepared as well as palatable pudding is made by covering a pie-plate with quarters of apples, then over this a crust of biscuit dough; bake and eat with sweetened cream or pudding sauce.

Some apples are better BOILED than baked. A very excellent and ornamental dish can be prepared in this way: Pare and core, without breaking or splitting open, some small-sized, tender and juicy tart apples. Boil them very gently, with one lemon or one orange for every six apples, till a straw will pass clear through them easily. Make sirup, while the apples are cooking, of half a pound of pure white sugar for each pound of fruit. When the sirup is ready, take the apples up, unbroken, with the lemons or oranges, and put into the sirup. Boil gently till the apples look clear. Again take up the fruit carefully, unbroken, and place close together in a dish. Then put an ounce or more of clarified isinglass to the sirup, and let it boil up. Lay a slice of lemon or orange on each apple, and pour the sirup over them. This is a pretty dish and also very good.

To FRY apples, take nice, tart specimens, slice the round way of apple, in rather thick slices, then roll them in flour and sugar mixed together; have a pan ready with melted butter, lay your apples in, cover tight, fry to a nice brown; be careful and not mash them up, and do not be stingy with your butter. Another method: Take juicy, thin-skinned, and not very sour apples. Slice them, leaving the skin on and put them to fry in some suitable dish in which you have a little melted butter. Add a very little water as often as proves necessary to keep them from scorching. Stir them quite often and when nearly done add a little salt and a spoonful of sugar, if you choose.

For other modes of serving apples, see Fritters, Marmalade, Sauces, Brandy and Wine.

Apricot (a′pri-cot). This is a very handsome and delicious dessert fruit for preserving in sugar or brandy, for jellies or pastries, for drying for winter use, and in some countries good liquor is made from it. The fruit ripens between the cherry and plum seasons. The propagation is by budding on plum stock in July. It is a favorite tree in the older countries for training on walls or espaliers, and a western or northern exposure is the most favorable. The pruning and general management of its cultivation are about the same as of the peach: especially its limbs should be shortened in. The apricot is not subject to diseases, but the curculio works on it a great deal, for the treatment of which see under Plum.

VARIETIES. *Breda.* Small, pale red in the shade, reddish purple in the sun; flesh orange color, juicy, rich, with a pleasant flavor; kernel sweet; ripens the last of July and first of August.

Early Golden. Dubois' Early Golden. Small, roundish oval, pale orange; flesh yellow, moderately rich and sweet. Tree vigorous with long slender branches; middle of July.

Large Early, Gros, Precoce, St. Jean. Large, orange, with a red cheek, sweet and rich; parts readily from the stone. Tree vigorous and productive, ripening its fruit about the first of August.

Moorpark, Anson's Dunmore, etc. One of the largest and finest apricots; yellow, with a red cheek; flesh orange, sweet, juicy and rich; parts from the stone; kernel bitter. Tree very productive, ripening the fruit early in August.

Purple or *Black.* Small, pale red, purple in the sun; flesh yellow, juicy, and pleasant. Tree has slender, dark shoots, and small, oval, glossy foliage; tree hardy as a plum; fruit ripens in August.

Aquarium (a-qua′ri-um), a glass tank of water for keeping live fish on exhibition. Goldfish, sticklebacks and minnows are among the easiest kept in fresh-water aquaria. The water must be pure and constantly renewed, having in it no organic decaying substance. Growing plants and healthy mollusks, as periwinkles, are indispensable. With all these, the favorite food of the fish should be given regularly. Success, however, in keeping an aquarium depends upon a skillful knowledge of details too numerous to describe here.

Arbitration, the settlement of controversies by referring the question in dispute to other parties and without recourse to law. The custom is, each party chooses a person, and these two choose a third, called an "umpire," who decides points upon which the arbiters disagree. This method of settling difficulties is simple, honorable and inexpensive, and has been urged by all moralists from time immemorial. From the fact that it is so little resorted to we infer that in most cases of litigation vengeance is the thing sought for rather than indemnity. It is well known, too, that most parties to a difficulty do not wish to have the trouble of securing arbitration, unless the decision is promptly executed by the one found in the wrong. Law is a means employed to *enforce* the fulfilling of contracts, which arbitration generally fails to do. Again, we know it is difficult for the parties in a controversy to procure the services of neighbors as arbiters, and it seems at first, in each case, that to obtain arbiters from a distance would cost more than a lawsuit. Furthermore, a lawsuit may be an "amicable" one, and of the nature of an arbitration. But with all these considerations, every one in his sober moments recommends arbitration, in cases where it will apply. The "grange" encourages it, the Bible commands it, and every code provides for it.

Arboriculture, the culture of forest trees: see Forestry.

Arboretum (ar-bo-re′tum), a place in a park, nursery, etc., in which a collection of classified trees are cultivated.

Architecture: see Residence, Barn, Ice-House, Dairy, Privy, etc.

Area (a′re-a), extent of surface. To measure areas, see Measurements.

Argand Lamp, one that has a cylindrical wick and a tall, narrow chimney. This form gives a little better light than any other.

Army Worm: see under Wheat.

Arrow Root, starchy food from the roots of several plants of tropical America. The Jamaica and Bermuda brands are the best in market. It constitutes a favorite diet for invalids, and is prepared as follows: Wet a teaspoonful of the root in a little cold water, with half a teaspoonful of salt; pour on it half a pint of boiling water, stirring it very fast; then set it where it will just boil up for a minute; sweeten it, and add milk, if allowed. For a drink make it very thin and add lemon juice and sugar: see also Blanc Mange, Gruel and Jelly.

Arsenic (ar′se-nic) and its preparations, as Paris green, ratsbane, Fowler's solution, etc., when taken in improper doses, produce pain and heat in the stomach, vomiting, burning dryness in the throat, and great thirst. The matter thrown up is generally colored green, yellow or brownish, and sometimes it is bloody. Diarrhœa or dysentery ensues, pulse becomes small, rapid and irregular. The breathing becomes much oppressed, and cramps and convulsions often precede death. Remedy: Give promptly a warm-water emetic, or use stomach pumps, or do both; then give hydrate of peroxide of iron, recently prepared, in quantity about thirty times greater than the poison which has been swallowed. In the absence of this hydrate, or while it is being prepared, give large drafts of new milk and raw eggs, or lime-water and oil, or melted oil, or magnesia or chalk in a large quantity of water, or even flour and water. The iron antidote can be in the form of a perchloride of iron dissolved with carbonate of soda, both of which are obtainable at the drug stores.

Artesian Well: see Well. Artesian water is not necessarily pure water; indeed it is generally mineral.

Artichoke, Globe. Of this plant, the undeveloped flower-cluster, which resembles a huge thistle-head, is the part eaten, being served with drawn butter. The plants are propagated first by seeds, sown in a hot-bed in March, and planted out at distances of two to three feet. To protect it through the winter, draw the leaves together and earth up around them, and cover the tops with litter. The time to cut the heads for use is immediately before the appearance of the blossom, just when the center of the head begins to open. It is not a very substantial article of diet.

Artichoke, Jerusalem. This is a plant of the sunflower family, bearing tubers on its roots, like potatoes on their subterranean stems, like which it is also cultivated. It is a poor article of diet for man, but good for hogs. Sometimes it is pickled, or cut up in vinegar and used as cucumber, or even boiled for eating by those who may like a sweetish, watery potato. It is as easy to raise as any common weed.

Asafetida, the dried resinous juice of the root of an Asiatic plant. Its effects on the system are stimulant, anti-spasmodic, expectorant and feebly laxative, and is much used in cases of hysteria, hypochondria, convulsions of various kinds, spasms of the stomach or bowels unconnected with inflammation, and in numerous other nervous disorders of a merely functional character, in whooping-cough, asthma, catarrh, croup, measles, etc. Medium dose, ten grains.

Ash, a valuable forest tree: see Forestry.

Ashery, a place where ashes are deposited; also, a place where potash is made. The cellar is a good place to deposit ashes. In putting wood ashes into barrels or boxes, remember that live coals from some kinds of wood, as the black-jack oak, will sometimes remain alive for weeks, when buried in ashes, and may set things afire.

Ashes. It is impossible to tell with any degree of certainty what the effects of a given manure will be on a given soil or crop. The kind of soil or its mechanical construction, the climate, season, mode of cultivation, and the value of the manure, all may have an influence in determining the result. The chief value of wood ashes consists in supplying the soil with mineral constituents, and in their action as solvents upon other insoluble salts already in the soil; also by neutralizing acids, and improving the mechanical condition of the soil. Barnyard manure is chiefly composed of water and organic matter, as woody fiber, starch, gum, sugar, gluten, and albumen in vegetables, and in animals the flesh, milk, butter, cheese, etc. The character and fertility of the soil depends very greatly on the nature and quantity of the organic matter it contains; yet while inorganic matter forms by far the smaller portion, this portion is absolutely essential to the production of useful plants. No seed can be produced without it; and the absence of a single element may render the soil unfertile or entirely barren. Competent authorities have estimated the annual exhaustion of salts by crops of grain, roots and grass, at from 180 to 250 pounds per acre; and as ashes (of plants) consist of these elements, they furnish one of the most needful manures for the soil.

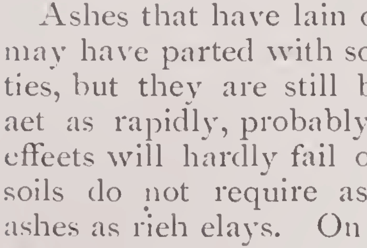
While ashes are beneficial to almost every soil, they are much more so on those that are sandy and gravelly than on clay, because the latter, being formed mainly from granite rocks, naturally contain potash.

In applying ashes to the soil they should be hauled out and spread over the ground previous to plowing. It has been the custom with some farmers, and may be yet, to apply them to corn on the surface, for the double purpose of obtaining the benefit of their fertilizing properties, and as a protection against grub worms. But that method is open to the objection that the plant can thus receive no benefit save from the small amount that is soluble and carried into the soil by rain. If they are incorporated into the earth previous to planting the corn, the roots of the plant and chemical action will evolve other elements which become assimilable and enhance the growth of the plant.

Ashes that have lain out of doors for some time may have parted with some of their useful properties, but they are still beneficial. They will not act as rapidly, probably, as when fresh, but their effects will hardly fail of being beneficial. Light soils do not require as heavy an application of ashes as rich clays. On the former, from fifteen to twenty bushels per acre is not too much; and double the quantity may be applied to the latter. Horace Greeley said he would apply a thousand bushels to the acre if he could get them.

Coal ashes are of no use to a sandy, loamy, or gravelly soil, but in a hard or stiff clay they serve to loosen up the soil, that it may be better aerated and saturated with manure.

Wood ashes, when carried fresh out of the house, should never be deposited in barrels or boxes near any building. Certain kinds of live coals, especially those from the black oaks, are deceitfully tenacious of igniting power, and often surprise the most suspecting in setting buildings on fire.



Ash-hopper.

Ashes, to Leach. Put them into a large box, hogshead, or hopper (see engraving), with straw or fine brush, or both, lining the receptacle all around and underneath the ashes. Place the box or hogshead on an elevated and inclined platform, so arranged as to collect all the lye into one vessel, which should be of iron; pour in enough water to fully saturate the ashes, but without starting the drain, and let them soak a day or two; then add water regularly and keep the drain going until the strength of the ashes is sufficiently exhausted.

Asp, or **Aspen**, a well-known small tree, called also "quaking-asp," and "poplar," characterized by its trembling leaves and light, white, soft wood, which readily decays.

Asparagus. This is the most healthful and palatable "greens" which the garden affords, and being early, is most welcome. As only the green portion of the sprouts are tender enough to eat, asparagus should be raised in the sun, and in an unmulched bed. Sow the seed in a bed late in the fall or in early spring, as soon as the ground can be worked. Sow in drills one foot apart, covering the seed about one inch deep. Thin the plants when up to three inches in the row. When one or two years old, remove the roots to a permanent bed, which should be of deep, rich, mellow soil, not too wet and cold. Here the old method is to trench the ground about two feet deep, filling up with well-rotted manure, "seasoned" with a little salt. Set the roots six to eight inches apart. The new method is to set them two or three feet apart, in soil prepared as for corn or potatoes, without deep trenching. Set them so the crown will be three or four inches below the surface of the ground. With the "field" method, in autumn they are to be plowed right over the crowns, as represented by Fig. 1, good stable manure filled in, and then the plants are covered with the plow, as shown in Fig. 2. The old method is to put the manure over the unplowed bed in the autumn and fork it in in the spring, taking great care not to injure the roots. Do not let the seed ripen, as that exhausts the roots too much for the production of large sprouts. Be patient, and the second or third year after transplanting there will be an abundance of shoots to cut. In cutting, be careful to avoid injuring the new shoots, and cover the cut stubs with soil. Cease cutting for the season as soon as the earliest peas are ripe. When the asparagus beetle

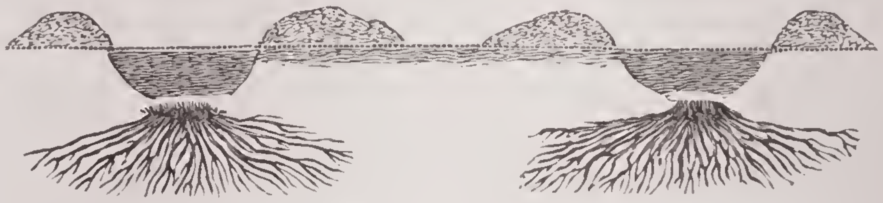


Fig. 1. *Asparagus Roots, Uncovered.*

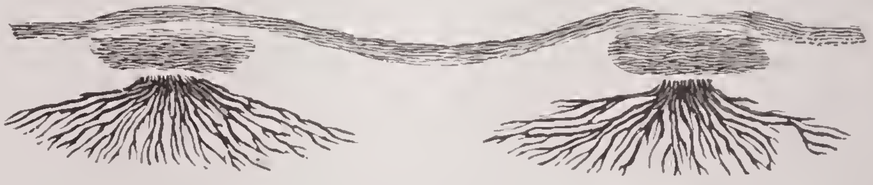


Fig. 2. *Asparagus Roots, Covered.*

is troublesome, let young chickens upon them by cooping up the mother on the beds.

VARIETIES. The standard variety is Conover's Colossal; but a new variety, called the Defiance, promises to supersede it. Other varieties are Van Sicklen's Colossal, Grayson's Giant, Largest Ulm, Lesher's Mammoth, and the New Giant. The latter has purple sprouts.

ASPARAGUS, TO COOK. This vegetable should be dressed as soon as possible after cutting, although it may be kept a day or two by putting the cut ends in water. Throw away all the hard and stringy portions (the whitest parts), tie the selected parts into small bunches, and boil them in a very little water about 20 minutes, adding a very little salt. The tougher portions can be boiled separately, a longer time. Take off the strings, put in a covered dish and pour drawn butter over it. Keep the heads all one way. A little saleratus will preserve its green color. Often served on buttered toast. The asparagus water can be made into a soup or gravy by thickening with flour or sweet cream.

ASPARAGUS OMELET is made by chopping very fine some of the vegetable which has been steamed until tender, and mixing it with the yolks of five and the whites of three well-beaten eggs and two tablespoonfuls of sweet cream. Fry, and serve hot.

Asphalt, mineral pitch, or compact native bitumen. Asphalt compositions for walks may be made thus: Take 2 parts very dry lime rubbish and 1 part coal ashes, also very dry, and both sifted fine. In a dry place and on a dry day, mix them, and leave a hole in the middle of the heap; into this pour boiling hot coal tar; mix, and when stiff as mortar lay it down 3 inches deep for the walk, on dry ground beaten smooth. Sprinkle over it coarse sand. When cold pass a light roller over it, and in a few days the walk will be solid and water-proof.

Asphyxia (as-fix′i-a), apparent death from suffocation. "Asphyxiated," to be in a state of asphyxia.

Ass. This animal, although the butt of popular humor and the target for arrows of scorn and invective, has not a bad temper when properly treated, and his usefulness is beyond question. The wild ass abounds both in Asia and Africa, and in some localities attains a large size. Bell noticed a wild animal of this species which he believed to be the origin of the domestic ass. It was of silver-grey color, with a broad, coffee-colored stripe. The domestic varieties of Western Asia are of a superior character. Some from Gozo Island, in the Mediterranean, attained the height of 14 hands. Three or four domestic breeds of Syria are treated with great care, and ladies are accustomed to ride on them. A domestic kind in India are not much larger than good-sized dogs. But the best is the Arabian ass, which is the finest in the world. They carry the head elevated, have fine and well-formed legs, which they throw out gracefully in walking or galloping. An improved and costly domestic breed, used principally in Kentucky and the Western States, for the production of strong, active and high-priced mules, is the Maltese variety. The best member of this breed stands 15 hands high. It is the practice to cross them with the Spanish and Southern French breeds. The first Maltese ass brought to this country was presented to Washington by Lafayette in 1787.

The ass, when properly trained, is docile, sagacious, and susceptible of strong attachment to his master. Even under injudicious training he long resists the effects of unkindness, and bears brutal treatment with firmness and courage. As a feeder the ass is the most economical in domestic use. He will maintain himself on much less than would be necessary for the horse; and as to quality, when nothing better is at hand, he will subsist on thistles, weeds, briars, or any other vegetation that he can obtain. But the ass is very particular about what he drinks; he will taste of nothing but the purest water. He requires but little care, and is seldom sick. After a hard day's journey he will lie down on a hard road, and rise in the morning refreshed and good-humored. He matures early, and can be trained or lightly worked at two years of age. The female breeds at three years old, and will give milk often for years after the foal has been taken from her. This trait is often taken advantage of by keepers, by continuing the impression that the foal is present. This is done by preserving the skin of the foal, and occasionally throwing it over another foal, and allowing the mother to smell of it. The milk of the female is very nutritious, and is used by sick people. The skin of both jack and jenny is equally hard and elastic, and is used for parchment, drum-heads and other special purposes. Jacks in this country are mostly used for breeding to mares for the production of mules. For the reason that the jack controls the quality of the mule much more than the mother, care should be taken to select the best jacks. Good specimens, however, are difficult to find, the best being found in Kentucky. For further facts in relation to breeding from jacks see articles on the Horse and Mule.

Assimilation, of food, the conversion of nutriment into living tissue. No article of food, however "nutritious," is of any value unless it is not only "digested," but "assimilated." Many persons eat much and yet are lean and weak, because some morbid condition of the system prevents the vital conversion of the chyme, or extracted nutriment, into real muscle, bone, etc.

Assets, cash or property belonging to persons or corporations which possesses a definite value.

Assurance, often used in the sense of Insurance, which see.

Asthma, a distressing affection that generally attacks persons in the night time, soon after retiring. The first symptom is a want of breath and a tightness across the chest. The respiration is laborious, and accompanied with a wheezing noise, that can be heard over the whole house. The disease is often accompanied with a want of breath that gives the lips and face a purple color, as if the patient was strangled; it rarely, if ever, proves fatal. Treatment—*Regular:* The best remedy is to produce vomiting. A teaspoonful of powdered alum in molasses is an effectual emetic; sirup of squills, in teaspoonful doses every half hour, will generally procure relief. Goose oil is very good to relieve the wheezing; smoking tobacco alleviates the complaint, but never cures it. Hive sirup (Cox's) is of great value; take a teaspoonful every two hours until the breathing is relieved. In the moist asthma, such things as promote expectoration must be used. In the dry asthma, antispasmodics and bracing medicines are most proper. The patient may take a teaspoonful of paregoric, twice a day or so, or a teaspoonful of Peruvian bark in powder, in a wine-glass of milk, before eating, once a day. *Homeopathic:* Of 10 pellets of aconite in a tumblerful of water, take a tablespoonful every half hour during the attack; or of arsenic, ipecacuanha or veratrum in the same way; or of nux vomica, 1 drop every 6 hours. *Eclectic* and *Botanical:* To promote expectoration, and to relieve tightness, give every 15 or 20 minutes a teaspoonful of the decoction of lobelia. To vomit, give half or two-thirds of a wine-glassful, which may be repeated, if it does not operate in thirty minutes or so, drinking plentifully during the operation, of some warming tea, pennyroyal, etc. *Hygienic:* Hot compresses to the throat and chest and sips of hot water until expectoration takes place or the distressing symptoms subside; tonic rubbing of the same parts in the morning before breakfast, with warm hands dipped in cold water; omit the third meal of the day, or at least let it be mostly of fluid food; and never let the body be chilled, or the feet get cold. Live out of doors as much as possible.

Astringent (as-trin′gent), a drug that causes organic contraction, as illustrated by the change of hide into leather. In medicine the leading astringents are, tannic acid, gallic acid, galls, oak bark, catechu, kino, logwood, geranium, blackberry root, uva-ursi, creosote, alum, lead, copper, zinc, permanganate of potassa, chlorinated soda, etc. Some practitioners use cold water and ice as substitutes for astringents externally applied. Among articles of food the most astringent are blackberries, raspberries, pie-plant or rhubarb, acorns, etc., and among the drinks tea takes the lead.

Atrophy (at′ro-fy), a wasting away from defect of nourishment. See Assimilation, Leanness and Marasmus.

Attorney, a person appointed by another to act in his stead, in legal proceedings. A "power of attorney" is the writing giving such authority.

Auction, public sale to the highest or lowest responsible bidder. The auctioneer is the crier, who makes the sale. He is bound by instructions. If price is limited he cannot sell below that price. If the owner does not wish an article sold below a certain price, that price must be announced before the article is cried; it is called the "owner's bid," and there can be but one such bid on any given article. Nothing can be honorably reserved which has the nature of "terms of sale." The auctioneer cannot buy at his own sale, nor can he bind an administrator or executor by warranty. Printed terms of sale cannot be varied by parol statements of auctioneer. Only the owner in person or some person specially authorized can do so. When real estate is sold, contract must be in writing, and the terms and sale made by the auctioneer must be signed by the person selling. When personal property is sold a delivery is sufficient; but in sales of personal property the thing sold must be present and delivered in whole or in part. If the purchaser does not comply with the terms of sale the seller may tender the property and sue for the price; or the property may, after tender and refusal to pay, be again sold at auction, and the purchaser at first sale be compelled to pay the difference, if any, between first and second sales. Generally the auctioneer is considered the agent of both parties, and entries and signatures by him as such are sufficient to bind the parties. Unless he discloses the name of the owner he will be considered owner. The purchaser is not required to accept property when the auctioneer refuses to give the owner's name, or when the title is found to be defective. An auctioneer is liable only for gross negligence or ignorance. But if he exceeds his instructions he is personally liable to any party injured. Fraud used by him to effect a sale renders the sale void.

Award, the decision of arbitrators in a disputed transaction.

Awn, the bristle or beard of wheat, oats, barley and the grasses.

Ax. As to the quality of an ax, very little is left to the judgment of the purchaser, as he generally finds it safe to trust the hardware merchant. But more attention should be given to the care of this most useful of all farm implements than is usually bestowed upon it. Labor and vexation are in a great degree prevented, instead of being multiplied, by keeping at least one ax on the premises in good order, and in some regular place where one can lay his hands on it immediately in case of emergencies. An ax, however, will never be kept sharp unless there is also at hand a good grindstone, kept in order. Many persons give themselves much unnecessary trouble by a reckless use of the ax—striking it into nails, stones, and other hard substances in wood or in the ground. One careless stroke often makes hours of trouble in repairing a gap in the edge of the tool, or in endeavoring to use the ax with the gap in it. While a thick-edged ax throws chips well, a thin-edged one is far preferable for rapid chopping. The older axes, which are kept for rougher purposes, as cutting things in the ground, driving stakes, spikes, etc., may be permitted to retain a thick edge. It never pays to try to do much cutting of clear timber with a thick-edged ax.

Every farmer should know how to make an ax-handle and put in one. Those sold at the stores are generally turned, and are therefore very easy to split. The best method is to take a piece of the white part, or sap, of any kind of hickory, cut it nearly into shape while green, and then let it thoroughly season, when it can be finished with a drawing-knife on a shaving-horse, and scraped with the edges of broken glass. To finish the handle when the wood is green will result in failure, as seasoning will crack and split it all over. Take the handle of some ax that suits you for a pattern, from which an outline can be drawn on the timber to be used.

To get an old handle out of an ax-poll, the usual process in the country is to drive the poll into moist earth up to the eye, and burn out the wood with a little fire of chips and litter; or, as some do, by burning out the old handle with such a fire, while keeping a wet cloth on the edge, without driving into the ground. Heating the edge will soften it, unless it is case-hardened by a process which requires a little more skill than most persons have.

The only proper way to fasten a new handle into an ax-head is to drive the handle through until the rough end projects a half inch or more, split that end in the middle from edge to edge and not from side to side, and drive in tightly a long, thin, neatly made wedge of hard wood; then saw off the surplus to just within one-eighth of an inch from the ax-head.

Axis, the central line of a body around which it revolves, as from pole to pole of the earth, and from journal to journal of a wheel.

Axle-tree and Axle-grease: see Wagon.

B

BABBITT Metal, a soft alloy of copper, zinc and tin, used for the bearings of journals, etc., to diminish the friction. It takes its name from the inventor. It may also be made of copper, tin and antimony, in the proportion of one-twelfth each of copper and antimony, and ten-twelfths of tin. A metal said to be cheaper than Babbitt metal, at 12 cents a pound, is the following: Six pounds of lead and one of antimony. Melt the antimony and then add the lead. Old type from printing-offices is often used for journal boxes, sometimes doctored up a little with alloys, as the case demands.

Back. For a weak back, bathe the part frequently with alcohol and beef's gall, or with neat's-foot oil in which berries of the red cedar have been boiled by gentle simmering. For a sprain in the muscles of the back, rub on, before a hot fire, an ointment made of Canada turpentine ½ ounce, soap liniment six ounces, and laudanum one drachm. For a "sprain" more internal, or "stitch," take absolute rest; take night and morning 15 or 20 drops of the balsam of copaiba. If the part is inflamed, apply cold-water cloths. Keep the bowels open by gentle aperients. *Hyg.:* Horizontal position constantly, warm compresses 15 to 30 minutes twice a day, and hand-rubbing twice a day.

PAIN. A pain in the back may be a symptom of any one of a great number of diseases, and the application of hot cloths and friction to the part is the only safe thing to do until a physician is consulted, how oft soever the doctor himself may mistake the case. There may be some disease of the kidneys, liver, urinary or uterine system, of a serious nature, with which it would not do to experiment or "tamper." When it is known that the trouble is in the muscles of the back, every one has his favorite liniment. Sitting in cold chairs, riding across a very cold wind for several hours, and severe lifting with a side or twisting draft, are all dangerous to the back. Often one exposes his back to rheumatic and kindred affections when asleep, by turning over in such a manner as to leave the sweating surface uncovered; or the night dress (shirt or gown) may be one of that objectionable kind which is open in the back and difficult to be kept buttoned close.

Back-furrow, to throw the earth from two plow furrows together, or toward the central line of the plowed land.

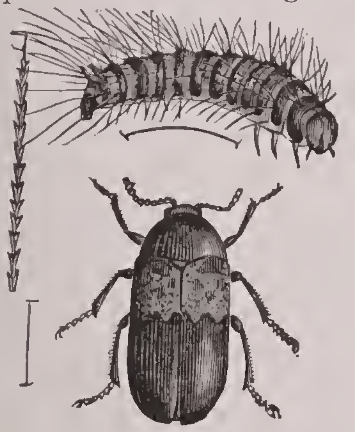
Backing, the backward motion of a draft-horse, by command of his driver. To teach a horse to practice this motion with promptitude and steadiness is an important part of his training. But backing also means the restive or vicious backward motion of a horse, in circumstances where he ought to move forward. Some horses practice this trick only in starting, and others practice it on almost any sort of occasion; some acquire it by some act or process of bad breaking, such as painful adjustment of the collar, pulling up hill, or sudden starting, and some appear to practice it from laziness, caprice or bad temper. Some may readily be cured of it by adroit management, gentle whipping, or the placing of strong obstacles in the way of backing, and others can scarcely or but temporarily be cured by such strong remedies as assigning them the middle place of an agricultural team of three or the near-wheeled place of a stage-coach yoke of four, where they will be dragged along by their companions till they find a forward draught much easier than a backing resistance. Backing in this second sense is also called *gibbing*. But backing in the third sense means the backing or first motion of a colt, or teaching him to receive and endure a rider. No person ought to attempt this who has not a considerable knowledge of the disposition and tricks of young horses, and some experimental acquaintance with the methods of controlling them.

Bacon, hog's flesh pickled and dried, usually by smoking. The most common way of converting pork into bacon is first to salt it thoroughly, usually by pickling. In England they have a long process of rubbing on the salt and letting it become absorbed, and repeating the application several times. Bacon can be smoked in a barrel or hogshead, nails being driven in the staves inside, on which to hang the pieces of meat, or poles put through holes in the staves near the top, by which the meat can be suspended. The meat should be cut in pieces, not too large for convenience and thorough curing. Smoke should be made with corn-cobs or clean, sweet woods. The fire should never be allowed to spring into a blaze; and if, perchance, it does, it should be extinguished as soon as possible; for the heat in the barrel or smoke-house will start the fat and damage the meat. The smoking should be done steadily and gradually, so that the curing will be perfect. Most good farmers have a smoke-house, with all necessary conveniences for smoking bacon and other meats. In the South, where it is difficult to preserve meats fresh, bacon is an important article of diet, the smoke-house being always supplied with the Southern staple meat.

Breakfast bacon is made by taking one half the side of the belly, and curing in sweet pickle the same as hams. The remaining half may be cured in dry salt, and, when smoked, will be choice bacon; or it may be cut in pieces five or six inches square, and cured in regular mess pork pickle, making the best of family mess pork.

The Kentucky method is as follows: Leave the meat in a strong brine for seven or eight weeks, then wash in lukewarm water and dry. When dry roll it in a mixture of equal parts of pepper and saltpeter, rubbing it thoroughly with the hand. Hang in the smoke-house under a slow fire, only partially smoking it. In the spring, before the flies come, paint the meat with New Orleans molasses; then smoke thoroughly. For further information about smoking pork see "Hams."

A method of making bacon without the tedious process of smoking is this: As soon as the meat is salted to your taste, which will generally be in about five weeks, take it out, and, if any of it has been covered with brine, let it drain a little. Then take good black pepper, finely ground, and dust on the flesh side, and on the hock end, as much as will stick; then hang it up in a good, clean, dry, airy place; if all this is done as it should be, you will have no farther trouble with it, for by fly time in the spring, your bacon is so well cured or dried on the outside that flies or bugs will not disturb it.


Bacon Beetle.
(Dermestes lardarius.)

If bacon is carefully put up, according to the above directions, the bacon beetle will not infest it: otherwise, there is no good remedy against the pest.

Bacon, to Cook. Frying is the simplest and most usual method of preparing bacon for the table, but is too often overdone. Five to ten minutes of frying heat is sufficient. Very few persons boil this article, but when it is determined upon, the following advice is given: If very salt, soak it in soft water two hours before cooking. Put it into a saucepan with plenty of water and let it boil gently. If a fine piece of the gammon of bacon, it may, when done, have the skin, as in hams, stripped off, and have finely powdered bread-raspings strewed over it. For a piece of two or three pounds, boil an hour and a half. To steam bacon, scrape the outer rind or skin well, wash the bacon, put it in a steamer over a pot of boiling water, and steam it at the rate of 20 minutes to the pound. Serve it with veal or fowls, or by itself with greens. In steaming bacon, no waste then takes place as to quantity, and the flavor is quite preserved, while the bacon is much more tender, as it cannot well be spoiled by too quick boiling.

Bagasse (bag-ass′), sugar cane after it is crushed. When dry it is good for fuel.

Bag Holder. A ring or half ring of wood or metal for holding bags while being filled. A good convenience.

Bag Truck.

Bag Truck. No grain-raiser likes to do without a bag truck. Such a convenience more than pays for itself every year. It is also often found handy in the removal of heavy boxes and other things.

Baking Powder. As alum, which has a bad effect on the bowels, is much used in the baking powder of the groceries, we give a receipt for making the powder without alum: Take ½ lb. tartaric acid, ¾ lb. pure soda (bi-carbonate) and ¾ lb. potato starch; pulverize and dry them separately; mix them in a dry room, pass the mixture through a sieve, and at once put into packages, pressed hard and covered with tin foil or close made paper, so as to keep it perfectly dry. One teaspoonful of this is used to each loaf of bread.

Balance. A spring balance is a spiral spring fixed in a graduated case, furnished with a ring handle at one end and a hook at the other, for the purpose of weighing small quantities, say, from one to five or ten pounds. Such a thing is very convenient, but after considerable use it becomes inexact and unreliable. Steelyards and weight scales are better.

Baldness, Preventive of: No. 1. Cologne, 2 ounces; tincture cantharides, 2 drams; oil of rosemary, 10 drops; oil of lavender, 10 drops. Rub well on bald part of head. No. 2. Brandy and onion juice, in equal parts, well rubbed on the bald places, will preserve the hair. Or, take 1 pint of boiling water, pour it upon a dozen large branches of fresh sage, or a large handful of the dried leaves, and cover it tightly for an hour. Put into a bottle 1 ounce of iron filings, nails, or any bits of iron, also a piece of borax as large as a walnut; turn the sage tea upon it. In two or three days it is ready for use. No. 3. 1 ounce of sugar of lead; 1 ounce lac sulphur; mix, and dissolve in 1 quart of rain water; pour off after it settles, then strain; use two or three times a day. This will both preserve and color the hair. *Hygienic:* To prevent baldness, do not wear close hats or caps, and bathe the scalp every day with cold water and rub it vigorously, as you do your face every morning. When a loss of the hair is suffered as the result of a fever, it is recommended to shave the scalp as often as once a month, in addition to the above treatment.

For taking hair or beard out of the skin by a drug, see Depilatory.

Balk (bauk), to refuse to draw (said of a horse when attached to a load); also, the act of balking. For treatment, see Horse.

Ball Cock, a wooden ball so suspended in a cistern that when the water rises to the supply cock the ball, carried up by the water, enters and cuts off the supply. It is guided by a perpendicular shaft. Its use is required when it is desired to have an automatic cut-off at that point.

Ball Valve, a valve consisting of a loose ball, fitting closely.

Balm, a plant of the mint order, sometimes cultivated for a pleasant medicinal tea, to aid in producing sweats; also, the resinous and odoriferous or aromatic sap of certain trees; also, any fragrant or valuable ointment.

Balmoral (bal-mor′al), a kind of figured petticoat; also, a kind of boot for ladies, made to lace in front.

Balsam, an older form of the word "balm," and signifying about the same,—more particularly, a resin containing more or less of an essential or volatile oil. Among the most celebrated are Copaiba, Tolu, Peru, Canada, etc., used for all sorts of liniments and ointments and many medicines.

Balzarine (bal′za-reen), a light, mixed material of worsted and cotton, for ladies' dresses.

Banana, a tropical fruit which is a first-class article of diet when ripe and fresh; but it is impossible to find such in the markets of the Northern States. In Mexico it is the custom of the natives to fry this fruit and season it very highly with pepper, etc., but this process deteriorates the dietetical quality.

Bandana, or bandanna, a species of silk or cotton handkerchief, having a uniformly dyed ground, usually of red or blue, with white figures of a circular or lozenge form, made by discharging the color. Also, a similar style in calico printing.

Bandog, a large, fierce kind of dog, kept chained.

Band Wheel, a wheel, in machinery, on which a band or belt runs.

Bandy-leg, a leg bending inward or outward.

Baneberry, a plant and its fruit, growing in dark woods throughout the United States. The plant grows about a foot and a half high, with a cluster of berries, white or red, extending up above all the leaves. The berries are about the size of currants, and look very tempting. Children sometimes eat them, and become dangerously poisoned. The remedy consists of the usual salt-water emetic, followed by constant movement around the room to prevent a fatal stupor. It is well also to use the stomach-pump when practicable, and give injections of tartar emetic. Also, throwing cold water in the face, giving strong coffee to drink, and doses of ammonia or asafetida are recommended.

Bank. Everybody finds the modern banking institution one of great convenience, and he patronizes it whenever he can do so. All the banks in this country are banks of deposit and discount. They lend money and take money for safe keeping, sometimes allowing the depositor interest and sometimes not. A large portion of them add to their business the circulation of bills secured by a deposit in the national treasury of an amount of government bonds more than ten per cent. larger than the amount in circulation. These are national banks, and are usually the safer and stronger of the two. A farmer ought to have as little as possible to do with the discounting and loan-making part of the business. With the deposit portion he is not likely to have too much. Nothing short of impossibility, no mere inconvenience of distance or time, should prevent him or any business man from depositing in bank all moneys for which he has not immediate use. If near a bank's location, it would be prudent to deposit everything except pocket change,—1. Because in any well-established and well-known bank, the deposit is in as nearly absolute safety as anything in this world can be. If stolen, or burned, or lost in any way, the bank and its individual stock-holders are liable. 2. In his own keeping, his money, if lost or destroyed by accident, is wholly lost. It is also a constant temptation to robbers. There is no better insurance against the raids of robbers than to have it known that money is never kept in the house or on the person. 3. In a vast majority of cases payment can be more conveniently made by check than by cash. Safety, avoidance of loss by robbery or accident, and convenience, are all in favor of bank deposits: against them nothing but the occasional inconvenience of having to visit the bank.

Since the resumption of specie payment national bank bills have been as good as gold, sometimes better, because more convenient in handling;

and they are equally good in all parts of the country. In most parts of Europe they pass at par as readily as the bills of the Bank of England. There are few situations of a business man's life in which they are not more convenient than specie.

Besides cash, any valuables, as government, municipal or railroad bonds, mortgages, deeds and muniments of title, are safer in the vault of a bank than in any private house, and a good many take such deposits for customers, with the reservation that they will not be responsible for losses. They are called "special deposits." The advantage to the depositor is the greater security against fire, robbery, and other accidents.

That every man knows his own business best, is the presumption of law and common sense; but it will do no man harm in his business to know something of the methods of men of brains, experience and success in other kinds of business; therefore the above suggestions are offered.

Bankrupt, a person who, by reason of his inability to meet his obligations, surrenders his property to his creditors, and seeks the relief allowed him by law; also, insolvent.

Bantam, a very small variety of fowl, with feathered legs, brought originally from the kingdom of Bantam, in Java.

Barbecue, to dress and roast a large animal whole, which is done by splitting the carcass to the backbone, and roasting it on a gridiron; also, the carcass so treated; also, the entertainment at which a barbecued animal is served.

Barberry, or **Berberry,** is a common, prickly shrub, eight to ten feet high, not cultivated very extensively, as the fruit is very small and too sour as an article of diet. The variety called the Common Red is the only kind raised in the West. Its numerous clusters of bright oval berries are very ornamental in autumn. In very rich soil the tree will grow 12 to 15 feet high, and bear very large fruit. There are varieties in Europe with pale yellow, white, and purple fruit. One variety has purple foliage, which is extremely ornamental; and there is a so-called "Sweet" variety, from Austria, which is really about as sour as the common. The culture of the barberry is of the easiest kind. A rich, light soil gives the largest fruit. It is easily propagated by seed, layers or suckers. To produce large fruit, keep the shrub free from suckers. Medically, the extract of barberry is tonic in small doses, and in larger doses cathartic. The fruit makes an agreeable preserve and jelly, and an ornamental pickle for garnishing some dishes. By crossing and culture it is thought that in time a very desirable dessert could be produced by this tree.

Barbet, a variety of dog having long, curly hair.

Barege, (ba-rage), a gauze-like material for ladies' dresses, vails, etc., of worsted, or silk and worsted.

Barilla, a kind of soda obtained from sea plants and used in making soap, glass, etc., and in bleaching.

Bark Lice, which infest the twigs of various fruit and ornamental trees, are easily distinguished. Lady bugs and certain mites are their enemies, but resort must generally be had to brushing, or strong alkaline washes, especially during the latter part of June, and whitewashing the trunk and larger limbs in the fall. A weak solution of kerosene is also good. The willow-louse should be "doctored" the last part of May, and the pine-leaf scale should be dosed both in May and August.

Barley. This is both a winter and a spring grain, like wheat, but in this country is generally sown as a spring crop. It requires a lighter soil than will grow good wheat, and a heavier than will produce tolerable rye or oats; but in all cases it must be one that is well drained. A mellow, rich loam, ranging between light sand and gravel and heavy clay, is best suited to it. It should be sown as soon as the ground is sufficiently dry in the spring, on a grass or clover lay turned over the preceding fall; or it may follow a well-manured and cleanly hoed crop. If sown on a sod it should be lightly plowed in, but not so deep as to disturb it, and afterward harrowed and rolled. The soil should always be well pulverized. Two or three bushels per acre is the usual allowance of seed. Poor or mellow soils, or early sowing, require the least. Barley crops should never follow the other small grains, nor should they succeed each other except on very rich soil. Barnyard manures should not be applied directly to this grain, unless it be a light dressing of compost on different soils, or in moderate quantity after the plants have commenced growing in the spring. When the growth is four or five inches high, rolling will be of service if the ground is dry and not compact.

The harvesting of barley must be done at a very particular time, as it will shrivel if cut too early, and shell if cut too late. The earlier cut the brighter. It may be stacked and taken care of like wheat, but to prevent discoloration and bring the highest price in the market, it should be kept dry and not be allowed to heat in the stack or mow. Barley which is plump and shining is best for the brewers. Nor should the grain be threshed out with a common wheat-threshing-machine, as the cylinder spikes bruise the germ and prevent it from sprouting in the brewer's vat. "Beater" machines, made expressly for the purpose, are far preferable. Barley is subject to many disabilities other than the most prevalent one of discoloration of the grain in curing. Those during growth are smut, blight and mildew. That during harvesting and succeeding harvesting is germination in wet weather. Discoloration is produced by dew and damp weather during curing, and from heating in the stack. To obviate this in the United States, when little danger of rain and dew is feared, the grain is placed in windrows, set in gavels without binding. Since the introduction of automatic binders, binding is again coming into favor, the shocks being carefully capped if rain is feared, and also at night to prevent the heads taking dew. On the great plains of the West, in the valleys between the Rocky Mountains and the Sierra Nevada, and in California, where there is neither dew nor rain during harvest, the brightest samples of barley are produced. There the grain is harvested, bound and shocked, and either thrashed immediately from the shocks or stacked and thrashed after sweating, which always takes place in grain or hay when stacked. This sweating usually occupies six weeks or two months, after which grain is usually dry enough for keeping in bulk or during transportation to distant markets.

When grain is infested with cockle, wild mustard or other weeds, they should be extirpated by hand before they are fairly in blossom. If neglected till some time after this, the seed is so well matured as to ripen after pulling, and if then thrown on the ground they will defeat the effort for their removal. When too luxuriant, barley, like rye, may be fed off for a few days, but not too closely. This, however, is seldom necessary.

Both as a green fodder and as a matured grain, barley is a good article of food for all kinds of live stock. Of course, care should be taken not to overfeed a horse with it at first, as it is thus liable to produce purging and weakness. The grain, in various forms, constitutes also an excellent article of food for man, although it is seldom prepared for this purpose. "Pot" or hulled barley is that from which the bran, or skin of the grain, is taken by a mill, and is used in mushes, puddings, etc. Pearl barley is more commonly found on the table.

VARIETIES. The principal varieties of barley are the two and the six rowed, the last being best for hardiness and productiveness, and the first excelling in plumpness and in freedom from smut. As sub-varieties we have the Hudson Bay, which ripens very early and bears abundantly; the Chevalier and the Providence, both accidental; the Peruvian, Egyptian, Saxonian, Mensury, Probstier, etc.

The uses of barley are various and important. In Europe it forms no inconsiderable part of the food of the inhabitants. The grain yields from 80 to 86 per cent. of flour, which, however, contains but six per cent. of gluten, seven per cent. being saccharine matter, and 79 mucilage or starch. It is inferior in nutriment to wheat and rye, but superior to oats. In this country it is principally used for matting and brewing, and in some cases for distilling, but when ground is more generally appropriated to fattening swine, though sometimes used for other stock.

Barley and rye differ little in their value as food for fattening stock. Corn is the most valuable of all the grains for purely fattening purposes. Rye ranks next in value in this respect, while oats are of the least value for fattening.

An average crop is 20 to 25 bushels to the acre, and the weight 40 to 45 pounds to the bushel.

PEARL BARLEY is the small round kernel which remains after the skin and a considerable portion of the barley have been ground off. For this purpose a distinct species of barley, of pearly whiteness, is chosen. It is steamed to soften the skin, dried and passed between millstones of a peculiar kind, to take off the husk, all except what lies in the deep furrow of the seed, and which is the cause of the short, dark line to be seen on pearl barley. This is of great value as a delicate article of diet, especially for invalids and those of weak stomachs. If one cannot make way with this article, prepared in some way or other, he cannot digest anything. The two principal methods of preparing it are as follows:

To boil pearl barley, it should be continued in the boiling process until it becomes as soft as it can possibly be made, which may require considerably more than an hour. Like the larger kinds, it soon becomes mucilaginous and slippery when in water, and appears to be thoroughly cooked long before it is in reality. Very little or no salt is required; but this, of course, depends more upon the taste of the eater than any thing else. Milk is generally admissible. Sometimes it is eaten with sugar. With all this care, however, one is apt to swallow it without sufficient mastication, as it is so slippery with its own mucilage.

But barley porridge is one of the best beverages, or dishes, in the world, for invalids. It is made by first thoroughly boiling the barley, leaving more or less water with it toward the termination of this process, according to the proportion of water and milk which will best agree with the patient; stir in the milk, according to said proportions, and drain off, and season to taste.

Barley Water, TO PREPARE. Wash 2 ounces of pearl barley in cold water; parboil it for a short time in half a pint of water, and then boil it, in 4 pints of water, down to 2 pints, and strain. Good beverage for invalids.

Barm, foam from fermenting liquors, which is sometimes used as yeast.

Barn, a building for the stabling of horses and cattle, and the storage of grain and other productions of the earth. Barns vary in location, size, cost and architectural beauty, according to the judgment, means and taste of their builders. They should, however, be something more than four bare walls enclosing a given space. Skill and judgment should be used in planning the barn, so that it will be properly and economically built and add to the general appearance of the premises. The attractiveness of the farm home will depend largely upon the exterior finish of the barn, its relative location as compared with the other buildings, and its surroundings. It is common with many to give no attention whatever to ornamental or picturesque appearance of the barn. Hence, the common remark that trees should be planted to hide the repulsive barns. The true rule, on the contrary, is to render every part of the premises neat and attractive. The barn should be a pleasing object; it should convey to the eye of the spectator the impression of comfort and completeness in the farm arrangements. A farm with a dwelling-house alone visible would seem to be only partially furnished. It may, therefore, be well for every farmer who has the means, to give to all his outbuildings an attractive exterior and finish; and even those who have small resources may give symmetry and architectural character a rough building, on the same principle that well-executed rustic work is better than costly and elaborate structures without taste.

The first thing to consider on determining to build a barn is its location. If possible it should be located upon a rise of ground, and where it is easy to keep the premises dry. Unloading wagons can generally be done at the upper side, and hauling out from the lower side. In this situation it is also easy to have a basement which will be dry and warm for the keeping of animals in stormy or cold weather, and which will afford good storage of root crops, pumpkins, etc. The basement should be walled up with stone, and no part of the wood-work of the barn should be in the ground. It should not be so near the house as to appear a part of it, nor so far distant as to be inconvenient.

After the location has been selected, the size must be determined upon. This must be based upon the amount the farmer wishes to store in it; upon the size of his farm; the number of acres of each crop, the kind and number of head of live stock, etc. It is quite impossible to go into every minute detail; but it is far better to canvass the ground thoroughly, and base the size of the building upon calculations carefully made than upon none at all. One error that is very general is the smallness of the barn, as the thousands of sheds, "annex" stables, hay-stacks, etc., attest.

The size once settled, the construction is next in order. It has been our design to present a sufficient variety of modern and carefully prepared plans and specifications, to enable the farmer to erect a barn without going to the expense of having designs made, and that he may have a large number to select from. By studying the relative merits of the various plans given, much valuable information can be gained, and the farmer will be capable of having a barn erected that will be the better suited to his wants and tastes. If it is decided that a basement barn is desirable, the next question to be determined will be, What use shall the basement be put to? Sometimes a portion of the floor above and the basement below are used for stabling purposes, and sometimes no use is made of the basement, except as a place for storage for the manure from the stables. If manure is carted out twice a year, it will not suffer materially by exposure during the time it lies in the yard. If, therefore, a basement barn should be used, the basement should be for stabling and storage of roots, etc., and under ordinary circumstances one should not stable on the floor above. There is no objection, as some think, in keeping stock in the basement of a barn, thorough ventilation being possible and readily secured; and when necessary, warmth is more certainly assured than it can be where boards alone are the only protection. In cases where a very large amount of stock is kept, it may be necessary to stable above as well as below. When that is done the floor above must, of course, be made water tight, which can be done by making it double, of narrow plank an inch and a half thick, the joints being laid in white lead.

In the larger portion of our Western country, however, there are no hill sides upon which to construct basement barns; they must, therefore, be built upon a level, in which case all the difference in construction between a barn of this character and one with basement stalls and stalls on the floor above, is the absence of the stalls underneath and the double floor of those on the main floor.

Barns should be planned for convenience. They should be so arranged, first, that the hay, straw, etc., may be easily put in them; secondly, so that the fodder may be taken to the stock with but little carrying; thirdly, so that the manure may be taken out without more than once handling, or wheeling a long distance; and, fourthly, so that the capacity of the same may be increased without destroying the convenience of arrangement. Special care should be taken to arrange for saving all the manure—drains and cisterns for liquid manure, and sheds for compost heaps, etc.; mangers and hay-racks so arranged as to save the hay from loss; boxes in which cattle may be fed chopped food, meal, slops, etc. Boxes are even better for hay-feeding than racks, as they save many small particles of the provender until it is eaten up, much of the hay seed, etc. Sheds may be conveniently arranged on the two sides of the barn-yard, to the south of the main building, in a way to protect the stock against storms and winds from all directions. The floors ought all to be tight enough to prevent anything from going through; clean, waste food can be picked up and saved, and the rest can be carefully scraped up and thrown into the manure heap; and the urine of the animals can also be properly conveyed to the drains.

It is a poor practice to drive stock to a distance for watering, if it can be avoided. Good cisterns at the barn will catch the fall rains and often have enough to supply the animals a large portion of the winter. With a pump in them the watering of cattle may be a task of pleasure rather than of dread.

The storing of hay in barn lofts has heretofore caused much extra labor, because the barns were not constructed properly, and until recently no easy mode of lifting hay was generally practiced. At present the many appliances in use (which are referred to under the head of Hay) make this labor comparatively easy. The success of the "railway" pitching apparatus and its great economy suggest the propriety of adapting and constructing barns for its use. A majority of barns throughout the country will admit it with little or no change, requiring only the removal of purlin beams, which are usually not essential to the structure. This mode of filling is particularly adapted to fine horse barns and carriage houses, and favors a high carriage room and stable, with hay loft and storage for feed and bedding overhead. Many are now building such barns, so as to take all hay, grain and litter into the loft from the outside by the use of the "railway." It is desirable that there be a clear space eight feet in width and ten feet downward from the peak, and doors which shall give an opening in one of the gable ends, eight feet wide and eight feet under the track. To make sure of the latter, there should be no cross beam nearer than ten feet from the peak.

The following are very essential features to be taken into consideration in the erection of a good barn:

1. All barns should have good eaves-troughs, connected with spacious underground cisterns. They will protect the walls, and furnish domestic animals a large supply of water, or no less than five barrels daily through the year, from a roof 35 by 70 feet, if there is an annual rainfall of three feet.

2. A broad, projecting roof, by sheltering the sides of the building, adds to its durability.

3. The basement walls should stand on a broad, deep trench filled with small stone or coarse gravel, to effect drainage; and if thick flagging, projecting some inches beyond the walls on both sides, forms their base over the small stone, rats will not burrow under them (Fig. 1).

4. In building basement walls, there should be a space of a foot between their outer face and the bank of earth, the excavation being a foot wider on each side for this purpose, which enables the mason to build a smooth outside, and to avoid the projecting points of stone, which, when the earth freezes in contact with them, dislocates the wall. The outside space is afterward filled with broken stone or gravel, and allows a free drainage into the ditch under the walls, as shown in Fig. 1.

5. Never allow an embankment of earth subject to freezing to press against a basement wall, the successive thrusts of the frost, sooner or later, throwing it over. A vertical stratum of coarse gravel or small stone should be interposed, as already mentioned.

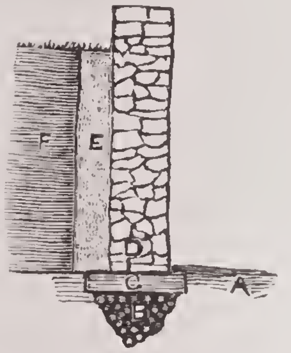


FIG. 1.—*Cellar Wall*—A, *Cellar Bottom;* B, *Drain;* C, *Flagstone;* E, *Gravel Space;* F, *Earth.*

6. The most convenient barns now built have the interior of the main floor entirely free from partitions, so that loads of hay and grain are driven in on any part, and separate narrow bays of any desired width are built up successively. When consumed or threshed these partitions are taken down in succession.

7. Every granary should be graduated on the inside, to show the number of bushels it contains below each graduating mark, enabling the owner to know at a glance how much grain he has on hand (Fig. 2). This graduation may be easily made by multiplying the cubic feet by 45, and dividing by 56.

8. Petroleum for inside floors makes them more durable; and for outside woodwork it is better than paint, penetrating into the pores, and giving common wood the character of cedar. Applied to the outside of this a coat of mixed paint (which adheres better to the oiled surface than any other composition) forms, with the oil, a very durable and perfect protection against weather.

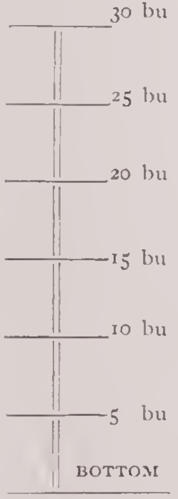


FIG. 2.—*Graduated Granary inside.*

9. Cattle yards connected with a barn which consists of a single compact building, should be well sheltered with evergreen screens. These form the most pleasing kind of shelter against winter storms, and any one who has seen cattle and sheep reposing comfortably under their broad, green, dense arms, while the snow clouds are sweeping over open fields, could not fail to be struck with their real value. They are the cheap-

est of all barriers against the storm. Trees of Norway spruce planted in a line from three to six feet apart, and growing, as they usually do, two feet yearly, will in a few years form a screen so dense that storms cannot penetrate it. For more ample security of earlier growth, it may be well to plant two rows of the trees, alternating, and not opposite to each other.

10. Barns and all out-buildings, whether of high exterior finish or made of rough boards, may be neatly constructed with an architectural or symmetrical exterior.

11. Particular attention should be given to ventilation. The air of the stable is not only deteriorated by the breathing of the animals, but it is further contaminated by emanations from the body, as well as by the noxious ammoniacal vapors arising from the manure. This may be easily perceived on entering the barn in the morning, when not only an offensive, but a pungent, ammoniacal smell is perceived. These vapors are hurtful to the lungs of the horse, and still more particularly to his eyes. The most effectual means of ventilation are large trunks or tubes of boards passing through the ceiling and roof into the open air. The tops of these should be covered in such a way that the heated air can go out, but no rain come in.

Stalls. All good stables are divided into stalls, one for each horse, and these are separated from each other by wooden partitions. If horses are placed together they are apt to do each other mischief, or are in some way inconvenient to each other. In some stables they are separated only by wooden bars, but these are not enough, for one will sometimes rob the other of his food, or do him harm by biting or other annoyance. Good stalls require to be six feet wide in general, and should be eight or nine feet in depth; that is, the partition should be of this length to prevent one horse interfering with another. The height of the partition should be 7 feet at the head and 5 feet at the heels. Ponies will do with stalls five feet wide; large dray horses require six feet six inches. When the stalls are too broad the horses will stand across them; when too narrow they cannot lie down, which is a necessary position for them to repose after being hard worked. It ruins a horse's legs and feet not to allow him to stretch his limbs in the stall. The stall-posts are uprights at the rear of the stall to stay the partition; they should be round or octagonal, not square. Sometimes they rise only a little above the partition, and sometimes they extend to the ceiling, which is firmest. Each side of this post should have a ring for pillar reins, which are used when the horse is required to stand reversed in his stall, as he is occasionally when being cleaned. In some stables there are, besides the stalls, some compartments much wider called boxes, for such horses to be in that are ill, or which require much rest. When horses are worked daily, it is proper to hang the harness of each on pegs in the wall opposite, to lose as little time as possible, keeping in the harness-room that which is used only occasionally.

Hay racks are usually made of wood. The front of the rack usually slopes forward, as illustrated by Fig. 3, that the horse may draw the hay more easily from it, and that it be more easily filled. But there are some objections to this form, and dust and seeds of the hay sometimes fall into the horse's eyes; and on this account some prefer having the bars or spars (as they are called) perpendicular. The spars should be round, two feet and a half high, an inch and a quarter thick, and two inches and a quarter apart. Each rack should have a ring at bottom for securing the horse's head. When tied to the spars he is apt to bend or break them. Some have made the spars turn round on a pivot to facilitate the coming out of the hay. The racks are also sometimes placed in the corner of the stall, forming the quarter of a circle, which gives more room.

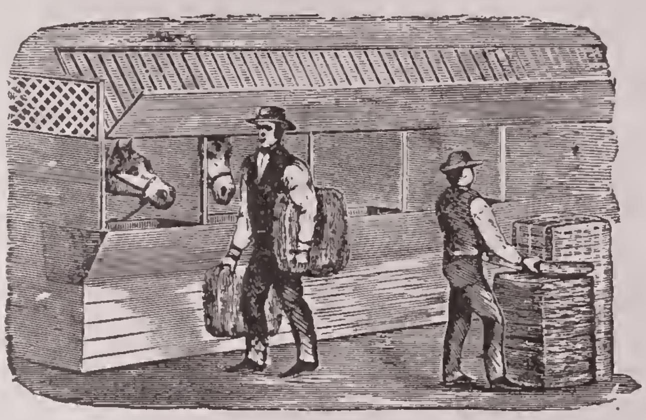


Fig. 3.—*Feed Rack.*

The usual mode of filling the hay-racks is from the hay-loft over the stable, by means of an aperture in the ceiling just over the rack. These apertures have been objected to; it has been said that the foul vapors from the stable rise up through them and contaminate the hay, and that the dust and seed of the hay fall down upon head, mane and ears of the horse, and in consequence it is recommended to abolish these apertures and to feed baled hay as shown by Fig. 3.

Cow Stalls. We give, in this connection, the plan of a very convenient cow or cattle stall, with illustrations of the floor, manger, etc. It is common to make a gutter in the floor of the stable, just behind the animals. This does not work well.

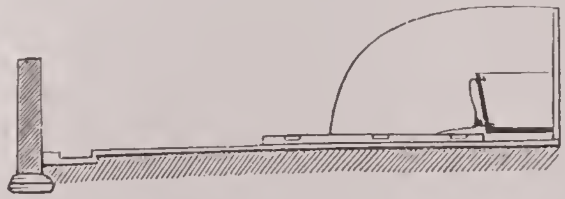


Fig. 4.—*Cow Stall.*

The solid droppings will soon impede the flow of the water, and make the gutter filthy and difficult to clean. It is better to grade the floor with a uniform fall to the rear of the stable, where a gutter for the water is to be made (Fig. 4). The solid material never reaches or obstructs it. The floor or platform upon which the cows stand is the important part upon which depends the cleanliness, health and comfort of the animals. To construct it, first lay a brick floor in cement all over the stable, and with a uniform grade from front to rear falling toward the gutter, with an inclination of about three inches in ten feet. Upon this lay out the stalls, with short partitions, but sufficiently high in front to blind the cows from each other. If the stalls be too wide, the cows will stand quartering and defeat your object, which is to make them stand so that their droppings will clear the platform. Then for the wooden platform or floor of the stall, make a simple frame like a sled, and cover it with plank. It should not be heavy. Two-inch plank will serve for the runners. Six inches is as high at the rear end as it should be. The forward end should be enough lower to make the top level when it is put in place on the inclined brick floor.

Fig. 5 shows the platform, and Fig. 6 exhibits it in place. It can obviously be adjusted to any length, by drawing it out or sliding it under the manger. One of these must be made for each stall, and fitted loosely between the partitions, so that it will slide freely, and that it may be taken out, if need be, for drying or cleaning. No rat can find harborage in such a floor, and it may be thoroughly washed by dashing water over it, which finds its way directly to the gutter. It never rots, and scarcely ever needs attention or repairs. And yet with all this adjustment a cow will sometimes crowd forward and deposit excrement upon the platform, or else back out and get soiled by lying down with her body partly on the floor below. The general result, however, is better than that of any other plan.

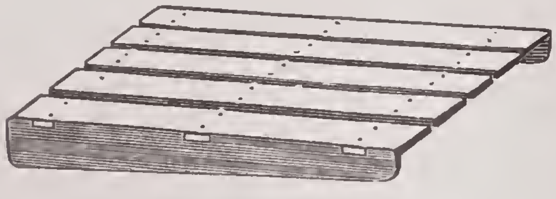


FIG. 5.

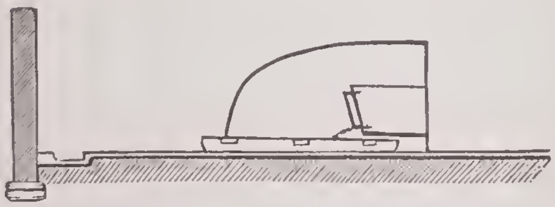


FIG. 6.

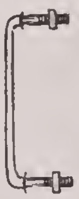


FIG. 7.

For securing the cows, use a traveler (Fig. 7) with a short chain and strap. The traveler is made of half-inch round iron, bent at each end at right angles, and with a thread and nut for securing it to the front of the manger, as shown in Fig. 8, or to a suitable post. A chain or rope eight or ten inches long, with a ring at one end, runs up and down the traveler. The other end is permanently attached to a wide strap, buckled around the cow's neck when she takes her place in the stall. With this she can feed comfortably, lie down, and turn her head. While it gives a little more liberty than is desirable on some accounts, it probably gives no more than her comfort requires.

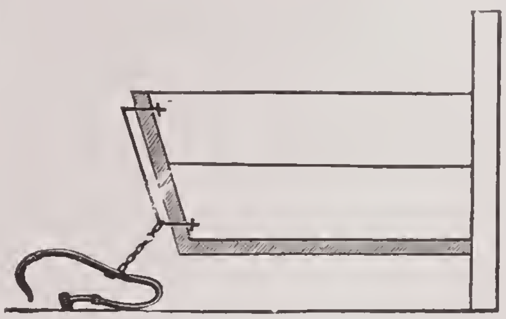


FIG. 8.

The cement floor, to be secure from cracking by frost, should be composed of very clean, sharp sand and the best Rosendale cement.

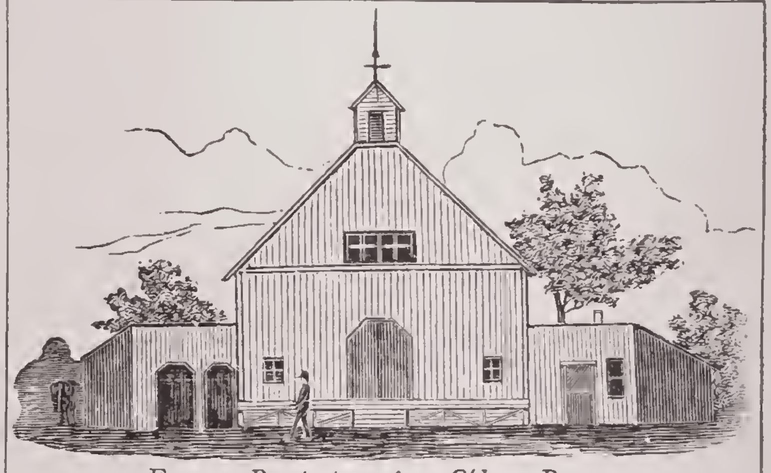


FIG. 9.—*Perspective of an Oblong Barn.*

BARN PLANS. Fig. 9 shows a fine barn, oblong in shape, with lateral wings, inclosing a yard, and adapted to a large farm. The foundation is of brick piers. The intermediate spaces can be closed up, forming a convenient pen for sheep,

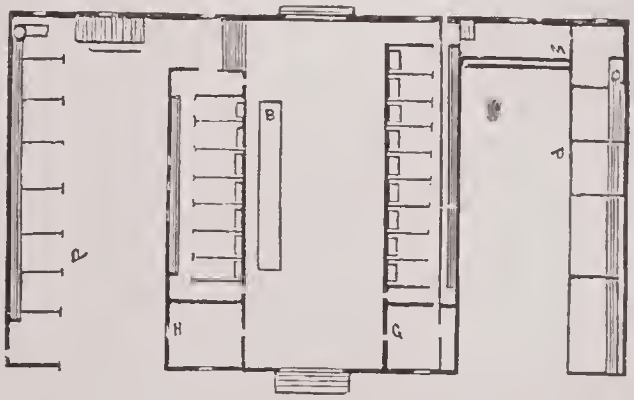


FIG. 10.—*Ground Plan.*

calves and hogs. The stalls in the main barn are on either side of the center space, which is 20 feet wide, forming a spacious drive-way. Above the floor of this drive-way, suspended from the principal loft, is a platform six feet wide for facilitating the feed of hay. An inclined way from the main floor runs down into one of the wings, as a convenience for washing carriages. Steps lead from the main floor into the hostler's room in the other wing. A harness room, 16 x 17 feet, is provided in the opposite side of the barn; also a granary, 16 feet square. Above the granary is a room for chopping feed. In the wings are cow and sheep pens, with troughs connecting with a pump in the corner of each.

Stalls of cast-iron, with feeding boxes, etc., can be used, or wooden stalls can be substituted for much less. A shute leads down from the hay-loft, with an opening in the manger, through which the animal feeds. This is made larger at the bottom than the top, to prevent hay from lodging or becoming packed in the shute. Near the bottom is a door, through which accumulated hay-seed may be removed and saved for planting purposes. The main building is 36 x 46 feet; the wings and yard, 24 feet; the pens 10 feet long; the driveway 20 feet wide. In the ground plan (Fig. 10) B represents the way to the hay, G a grain bin, H harness room, M the man's room, P on the right represent sheep pens, on the left stalls for cows.

For this barn we give the specifications, bill of quantity of material, and an estimate of cost. We deem this unnecessary for every plan, as any carpenter or builder who is capable of building a good barn can work after the plans given in this work.

Specifications.—The front and rear doors are double, 5 feet wide by 13 feet high each, hung on good, double, wrought-iron hinges. All windows in lower part of stable 2 feet 6 inches by 3 feet 6 inches, of 4 panes to a sash, double windows, both front and rear, in loft 4 lights to a sash, 4 x 3 feet. Door to living room, pine, with 3 raised panels, with good lock with porcelain knobs, both windows to be 2x4 feet, 2 lights to a sash. Stable fittings, stalls, etc., to be portable, with wooden posts, cast-iron troughs and heavy gauze headboard, which cost very little more than the oak stalls. Foundation walls to be 18 inches thick, set 3 feet under ground. One chimney flue of 6 inches in living room.

Bill of Quantity.—Included in the estimate are the following materials:

18 corner and intermediate posts 24 feet long, 8 x 10.
376 feet of sills, 10 x 2 inches, convenient lengths.
254 feet of plates, 6 x 10 inches, convenient lengths.
4 tie-beams, 54 feet long, 10 x 12 inches.
6 principal rafters, 20 feet long, 10 x 10 inches.
3 collar beams 24 feet long, 10 x 12 inches.
6 struts 12 feet long, 8 x 10 inches.
19 posts, for sheds, 14 feet long, 6 x 6 inches.
19 posts 18 feet long, 6 x 6 inches.
1,000 feet of girts and braces, 6 x 3 inches
256 feet of purlines, 10 x 12 inches.
80 rafters, 20 feet long, 8 x 2 inches.
80 rafters, 13 feet long, 8 x 2 inches.
600 feet of braces, etc., 6 x 2 inches, inconvenient lengths.
160 joists, 13 feet long, 12 x 3 inches.
1,100 feet of girts and plates, 6 x 3 inches.

Estimate of Cost:

Excavation	$ 25 00
Foundation, brick or stone piers	85 00
Framing, including sills, girts, plates, etc	241 50
Floor joists, including bridges, etc	150 00
Siding or weather-boarding, including battens, etc., 9,800 feet	274 40
Sheathing of roof, 6,100 feet	122 00
Shingling, 61,000, at $4.20	256 20
Flooring (part 2 inches thick), 4,500 feet	180 00
Rafters, including trusses, braces, etc., 6,100 feet	183 00
Windows, including ventilators, etc	120 00
Doors, including hardware, etc	60 00
Stalls, including fittings, mangers, etc	125 00
Pens, complete	80 00
Grain-bins, steps, ladders, etc	60 00
Painting and glazing	110 00
Sundries	40 00
Total, including labor, etc	$2,112 10

A CURB-ROOF BARN. Fig. 11 represents a curb-roof barn, known also by the terms gambrel or mansard roof, and distinguished by the angle half-way up the rafters. It has an important advantage in giving more capacity for a given amount of siding and shingles; and a greater height above the eaves or posts, which presents no difficulty in filling, now that the work of pitching from the wagon load is wholly performed by the horse-fork. The cross timbers above the cross beam being entirely omitted (except at the ends or outside), the horse-fork has room to work freely. The main portion is 40 by 56 feet, and it is well adapted to a farm of 100 to 150 acres.

Beginning with the plan, Fig. 12, the construction is briefly explained. The beam between the bay and threshing floor is 12 feet high, and the girth being left out, the whole floor is accessible for the storage of wagons, farming tools, etc., after the grain is threshed or the hay fed out. Broad, sliding doors open from the outside (on the left) to this floor, and a narrower door at the opposite side. The whole floor is covered with two-inch pine plank, planed and matched. The bay, which is 15 x 40 feet, is represented by A in Fig. 12. The threshing floor, 12 x 40 feet, is indicated by B, and the dotted line between the two shows the beam 12 feet high. C represents the cut feed and oat room, 12 x 22 feet.

The cellar is under this floor, 40 feet square (occupying all the barn except the horse stables), and 8 feet high in the clear. It consists of an open shed on the side next the cow stable, 10 x 46 feet, with mangers next to the walls. The remaining space, 30x40 feet, is inclosed, and has likewise mangers next the wall. The building stands about four feet above the level of the ground in front, and the earth is filled in so as to make an easy ascent. The granary, marked G, affords ample storage for threshed grain.

The horse stable, represented by D, is 16 feet wide, 16 inches below the main floor, and 8 feet high, is entered by a sliding door on the left wide enough for two horses to pass. There is room for eight horses. The larger stall for two horses is often convenient for feeding a harnessed team. The others are 4½ x 10 feet in the clear, and the box hay feeders are those now commonly employed, extending upward about 20 feet, with doors at the sides at different heights to throw in the hay. The space over the horse stables is occupied with hay for feeding them, the floor of this bay being about seven feet above the floor of the barn.

The cow sheds and stables, which are shown by E and F, are 22 x 30 feet, having a space overhead for the storage of fodder. The end view of the frame, Fig. 13, needs but little explanation. There are no purline girths, beams or braces (except at the ends) to interfere with the free working of the horse-fork. Although the sills of the horse stable are lower than the others, the plates are on the same level. The ventilator is 5½ feet square and 7 feet high, with blinds. A corn and wagon house is adjacent, 20 by 24 feet, with grain bins overhead, and places for the storage of corn in the ear on each; the wagon passage below; with a hog-pen underneath, in a walled basement seven feet high. The cost of this barn would vary much with the price of materials and with various facilities, from $1,800 to $2,500.

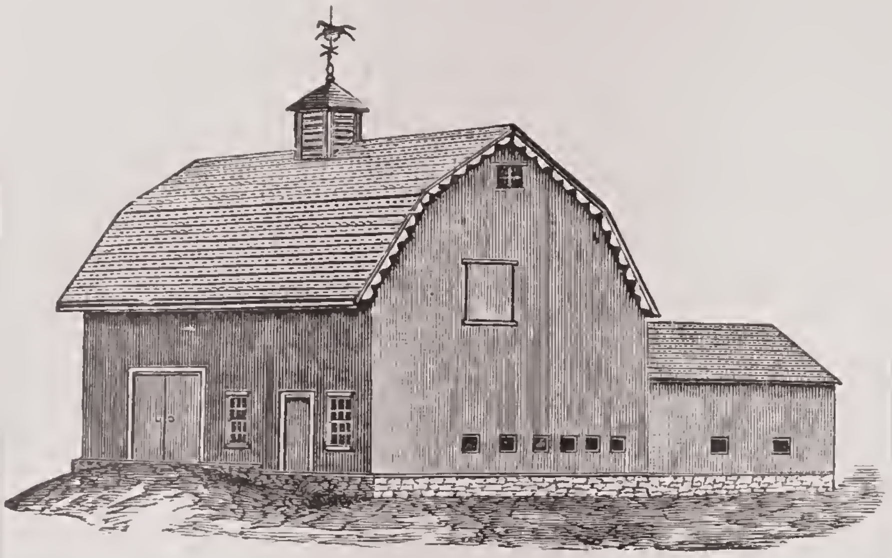


Fig. 11.—*Curved Roof Barn.*

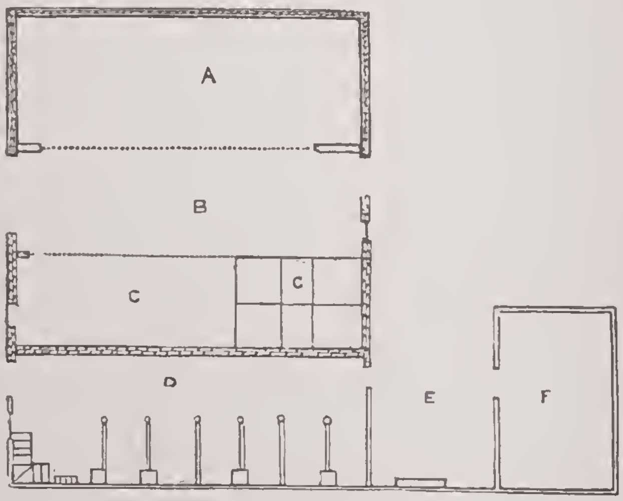


Fig. 12.—*Plan for Fig. 11.*

Carriage and Horse Barn. Fig. 14 is a view of a carriage and horse barn, built of wood, with rough vertical and battened boards, but designed with a view to symmetry and ornamental exterior. It is 25 x 35 feet. Fig. 15 represents the ground plan. The carriage room is 15 x 25 feet, which admits two carriages to stand side by side, with ample room to pass around them, and four can be placed within it without inconvenience. This apartment is separated from the stable by a matched board partition, with a door between them. Pins for harness are put in this partition, obviating the necessity of a separate harness room.

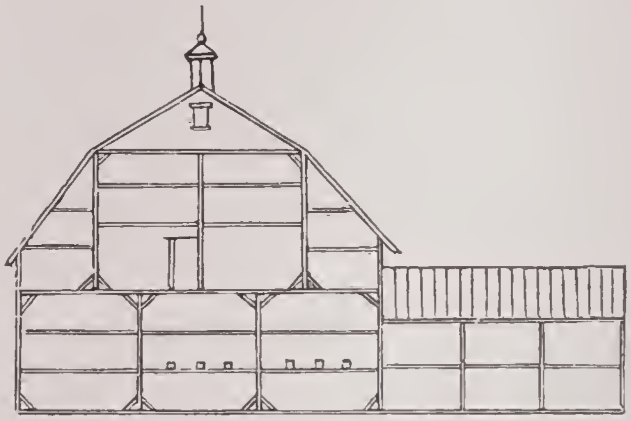


Fig. 13.—*End View of Frame.*

The horse stable is 15 x 25 feet, giving space for four stalls, each 5 feet wide and 15 feet long, which is the shortest length admissible, with free passage around the rear of the horses for leading them out, removing manure, etc. The light being admitted behind them, the animals' eyes are not injured by light, as they would be if their faces were in front of the openings, and the ventilation from without is more perfect. The mangers are only breast high, admitting free circulation of the air between stalls and passage. The arrangement is such that any horse can be taken from the carriage room to the stable, or the reverse, with only a few steps, and all within doors, so that there is no exposure in time of rain or snow storms. A pump at *w*, from the rain-water cistern below, is convenient for watering. The place of the ventilator is shown by the dotted lines at *v*. It reaches down to the floor above, and passes up through the roof. It has a large board valve near the top, which may be opened or closed at pleasure by means of a rod extending down within reach. This ventilator is simply a square board box or tube, two feet or more square, allowing the immediate escape of all bad odors from the stable, preventing the diseases so common in horses that have to breathe rank exhalations. In the side of this ventilator, in the hay loft, is one or more large board doors, hung above and swung inward, through which the hay is thrust for the horses below. As soon as the forkful has dropped, the door falls shut, and excludes any possible vapors of the stable from entering the loft. The stairs at the end of the passage are boarded up, and a door shuts the passage between the stable and stored hay. Under the higher part of the stairs is a closet for brushes, curry-comb, soap, oils, etc., and *b* is a bin for horse-feed.

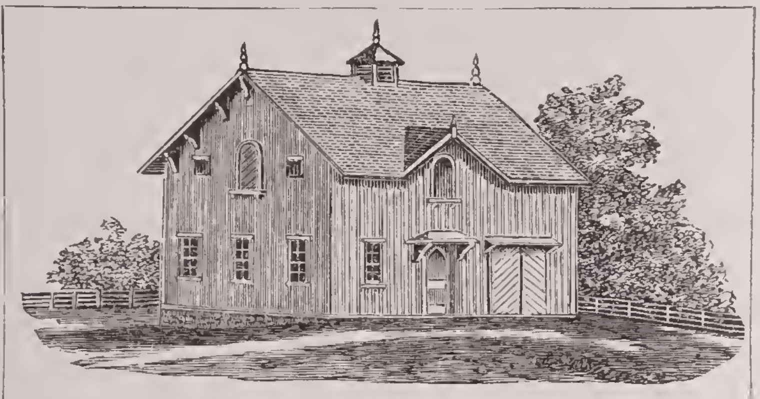


FIG. 14.—*Carriage and Horse Barn.*

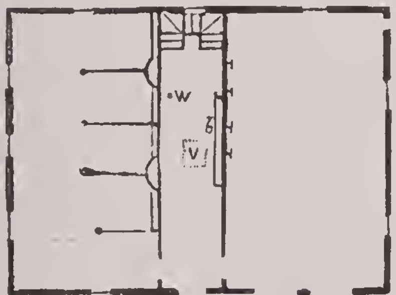


FIG. 15.—*Plan for Fig. 14.*

The lower or main story of this barn should be about 9 feet high in the clear. With a good ventilator this is better than 12 feet without a ventilator. With 14 feet posts, there can be a hay-loft over four feet high at the eaves, and with one-third pitch of the roof.

Fig. 16 is a view of a modification of this barn, so arranged that it may be made five feet shorter, the dimensions being 25 x 30 feet. Fig. 17 is the plan. The horses' heads are placed toward the outer wall, each stall being lighted by a large single-pane window. In order to exclude the light from the horses' eyes, these windows are set seven or eight feet high; and immediately under them on the inside, is a narrow plank hood or shelf, entirely covering the light at the animals' heads. The hay is thrown down from above through the square boxes, from which the horses obtain their supply through the side openings at the bottom. A separate harness room is provided. Pins may be placed in the partition in the carriage apartment, in addition, if desired, as described in the preceding design.

The plan of a third design is shown in Fig. 18, the object being to provide for both cattle and horses. The dimensions are like those of the first plan, 25 x 35 feet. There are four horse stalls, each five feet wide, and two cow stalls (C), each four feet, with a post between. The ample width of the passage between them prevents danger of the horses kicking the cows, especially if the more quiet animals are placed opposite. The harness room is five by eight feet. A small entrance door is needed at the side, the animals being led out at the end; and a door in the close partition between the stable and carriage house, admits ready passage from one to the other. A large box or bin for feed is shown at *b*.

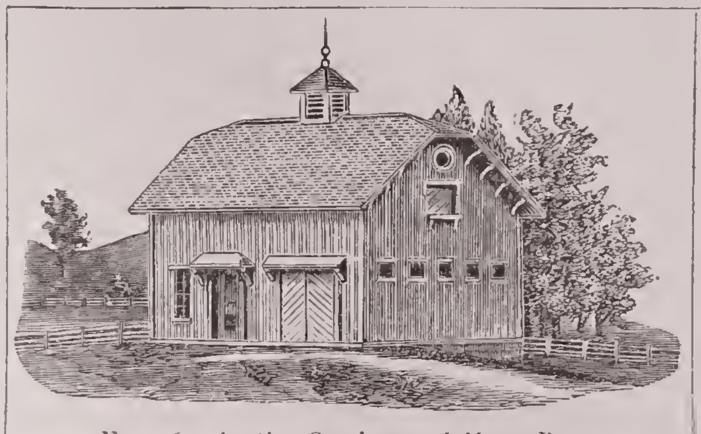


FIG. 16.—*Another Carriage and Horse Barn.*

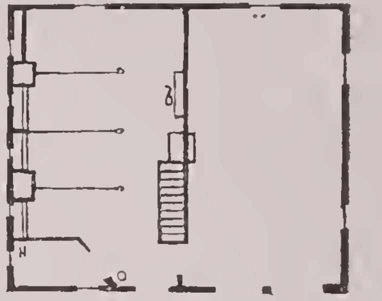


FIG. 17.—*Plan for Fig. 16.*

The cost of such barns will depend greatly on the price of materials and labor where they are erected, and the degree of finish given them. They can be built from $800 to $1,500. White-oak plank, planed and matched, for the divisions of the stalls and for the floors, will be better than hemlock or pine, but cost more. Good pine siding will be better, but more expensive, than hemlock.

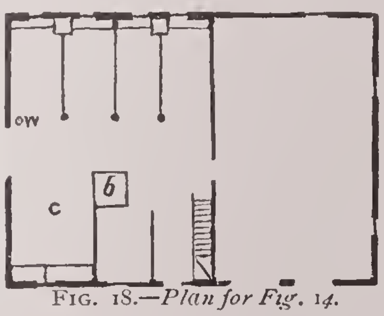


FIG. 18.—*Plan for Fig. 14.*

THREE-STORY BARN.—Before the introduction of the horse-fork, some of the best barns in the country were built three stories high, where sloping ground permitted the entrance to the upper story with a loaded wagon. Properly arranged and constructed, they still possess some important advantages, among which is the facility with which grain may be passed from the upper story to the lower during the successive operations of threshing, cleaning and bagging. The basement is 60 feet long, 24 feet wide, and seven feet high in the clear. The walls contain 70 perches of stone work. The floor above is supported by two rows of pillars, Fig. 19. Those in the outside row are two by six feet, the inside ones being two feet square. The barn is 48 feet wide. The floor of the cow stable, which is directly over the basement, rests upon joists that are laid upon cross sills, and reach from the ends of the front pillars to the rear ones. The joists rest upon the cross sills as far as the latter reach, and then upon the pillars. The cross sills are ten inches square. There is thus a drop of ten inches in the floor upon which the cows stand, and immediately behind them. This drop, G, Fig. 20, is four feet wide, and forms a passage in which the manure collects, and from which it may be pushed through the side of the drop to the basement below. The liquids from the cows drain through this open space upon the manure in the basement. The floor upon which the cows stand, seen at F, is six feet wide. There are nine stalls for cows, F, Fig. 20, each of which is four feet wide. In each stall is a manger and a feed box. The cows are tied by means of ropes around their necks. There is a passage, E, Fig. 20, between the cow stable and the horse stable, C. In the latter there are five single horse stalls, and two closed, loose boxes. Each single stall is five feet wide. When the horse stable is cleaned, a wagon is driven into the shed behind it, B; the manure is thrown into the wagon, and at once hauled wherever it may be needed. The floor of the horse stable is on the ground. The shed B, Fig. 20, is for storing tools and wagons, or housing sheep, and has a door, A, at each end. The stables are eight feet high, and the barn reaches 18 feet above the stables. The plan of the barn floor is shown by Fig. 21; A is the main floor; at B B are the entrance doors, to which a sloping driveway, abutting against the wagon shed, leads. The rear doors, C C, are hung upon rollers. At D is the trap for hay, leading to the feed passage below, and E E E are traps for straw used for bedding, leading into the stables. The granaries are seen at F F, and there are spouts from these leading into the wagon shed, so that sacks upon the wagon can be filled from the spouts. The passage to the granaries is at G; it is eight feet wide, and a work bench with tools is kept here. The staircase leading down to the feed passage is seen at H. The trap doors are double and on hinges. The floor is also double, so that no dust can fall through to the floor below, nor any disagreeable vapors arise therefrom. This story is eighteen feet clear, there being a truss roof, which is self-supporting. The roof is shingled with pine shingles, and the whole of the barn is covered with pine weather-boarding, and painted.

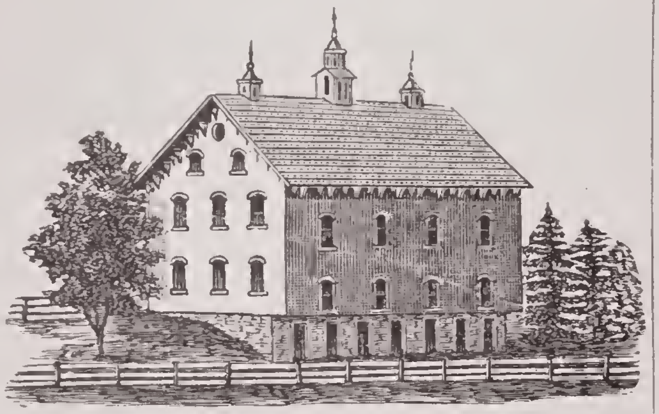


Fig. 19.—*Three-Story Barn.*

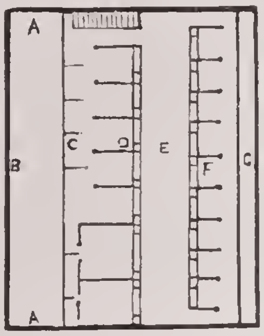


Fig. 20.—*Plan of Stable Floor.*

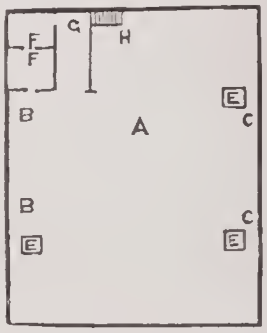


Fig. 21.—*Plan of Barn Floor.*

A Large Horse and Cattle Barn. Fig. 22 represents a very commodious and also an expensive barn. It is 84 feet square and nearly 50 feet in extreme height, not including the cellar. There are 84 stalls provided, as indicated in the ground plan, Fig. 23. There are two rows of horse stalls on one side, and three rows of cattle stalls on the other. The proportions of the interior are as liberal of space as those of the barn itself. The central drive-way or barn floor is 16 feet wide. The carriage and wagon rooms on each side of the floor are both 20 feet square. Large, loose boxes are for the accommodation of stallions. The various passage-ways between the rows of stalls, and at the rear of them, are four

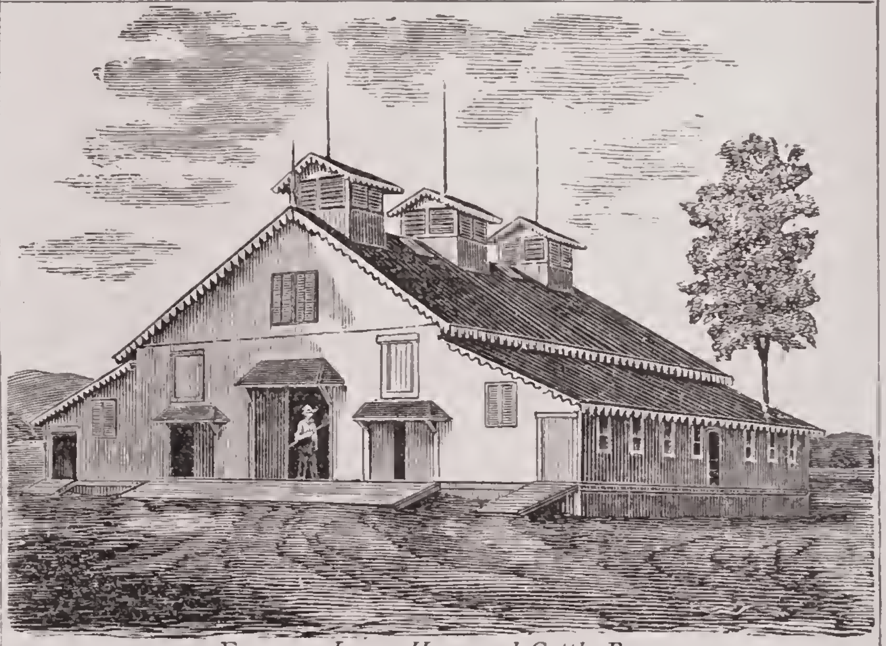


Fig. 22.—*Large Horse and Cattle Barn.*

feet wide, while the horse stalls are nearly six feet, and the stalls for two cows eight feet in width. The two spaces inclosed between dotted lines on the barn floor indicate the position of the hoistways under the skylights for hay. The spaces at either end outside these hoisting spaces are floored over above the great doors, and are finished off as granaries for keeping the supply of oats, meal, etc., required for the stock. On each side of the barn is a rain-water cistern, 12 feet 9 inches in diameter and 25 feet deep; these are connected by a pipe, passing underground across the front of the barn. There are seven windows on each side, and six, besides the five sliding doors, in each gable. These, with the three great ventilators, afford unusual provision for pure air. The cattle are fed from the floor above. The passage between the rows of horse stalls is for feeding. The building stands upon 54 stone pillars, and has a tight board floor, any part of which may be easily removed, as occasion may require. With a large corn house 35 feet square, not seen in the engraving, this barn cost $9,000.

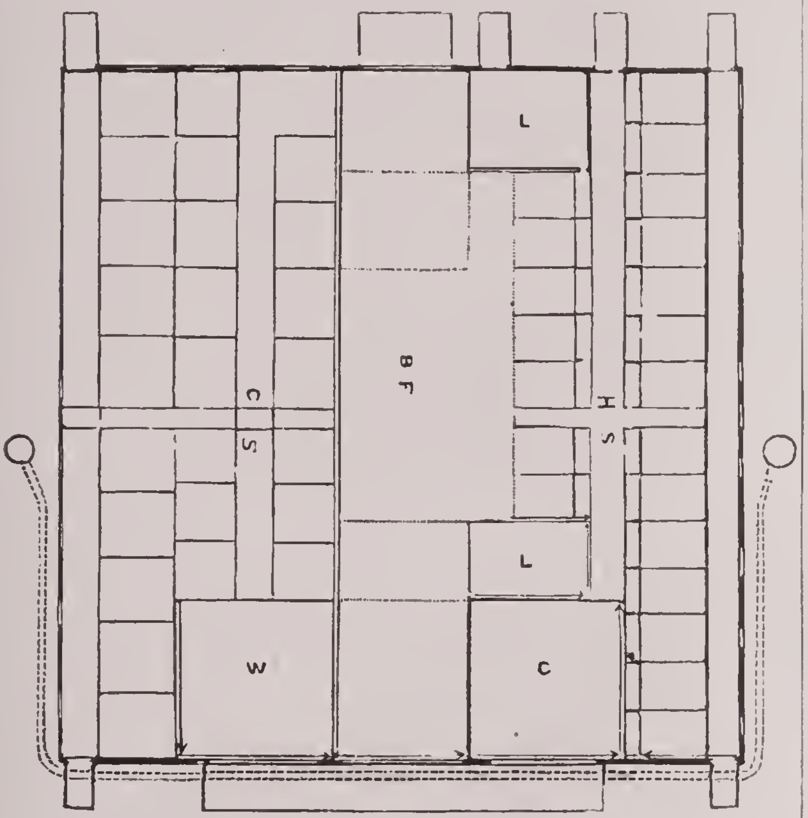


FIG. 23.—*Ground Plan for Fig. 22.*

In the ground plan, B F represents the main floor or drive-way, 16 x 84; H S, double horse stalls; the space extending the entire length of the barn in front of the stalls, both the horse and cattle stalls, is four feet wide. It is entered by doors at each end; C S represents cattle stalls; C, carriage room, 20 x 20; L, loose boxes, 10 x 16; W, wagon room, 20 x 20.

MODEL BARN. Fig. 25 represents a magnificent barn, commodious in all its proportions, substantially built and of architectural beauty and symmetry. It is perhaps as large and expensive a barn as almost any farmer will desire to build. The main building is 55 x 80 feet. The wings are each 56 feet long: one 31½ feet wide, the other 35 feet. The four leading features of this design are: first, economy of room under a given roof; second, plenty of light; third, plenty of air, and ventilation which would draw off all the deleterious gas as fast as generated: and fourth, convenience to save labor. Saving of manure and many other things were of course included. An important point is the numerous windows, which are hung with pulleys, and may be lowered on warm days in winter and closed on cold days.

The barn is provided with a good stone basement, the plan of which is shown by Fig. 24. This is arranged for hogs, roots and manure. The fixed partitions in the cellar are only two, one inclosing the root cellar, represented by R, and the other outside of that, shutting off a wide cemented passage way, extending from the door at the northeast corner, around two sides of the root cellar, as shown in the basement plan. The divisions marked H are pens for hogs. The remainder of the basement is used for manure.

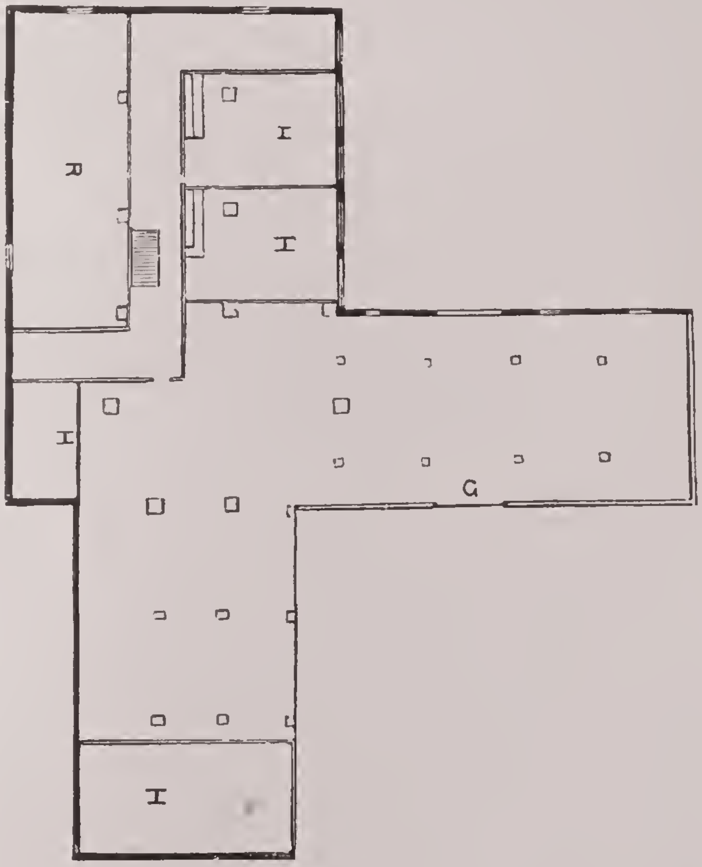


FIG. 24.—*Basement Plan for Fig. 25.*

The main floor (Fig. 26) is entered by several doors. Two double doors open upon a capacious floor in the rear of the horse stalls, which extend through the middle of the main barn. The horse stalls are indicated by H S. A large harness and tool room is shown by H R. C R indicates a carriage room. This is situated to the right of the front entrance, and is closed by a sliding door or partition. There is room on the open part of this floor, behind the horse stalls, and adjacent, to drive in three wagons at a time, and let the horses stand hitched. O X in one of the wings indicates ox stalls. Between these stalls is a ten foot passage way, through which carts with roots or green feed may be driven, the stairs in the middle being hinged at the ceiling and fastened up. The stalls are seven feet wide and are arranged to tie up two cattle in each. A gutter to conduct off the urine runs along behind each range of stalls, and there are well secured traps, one in about every 15 feet, through which the manure is dropped to the cellar. The letter C, whenever it occurs in Fig. 26, indicates a trap door of a manure drop.

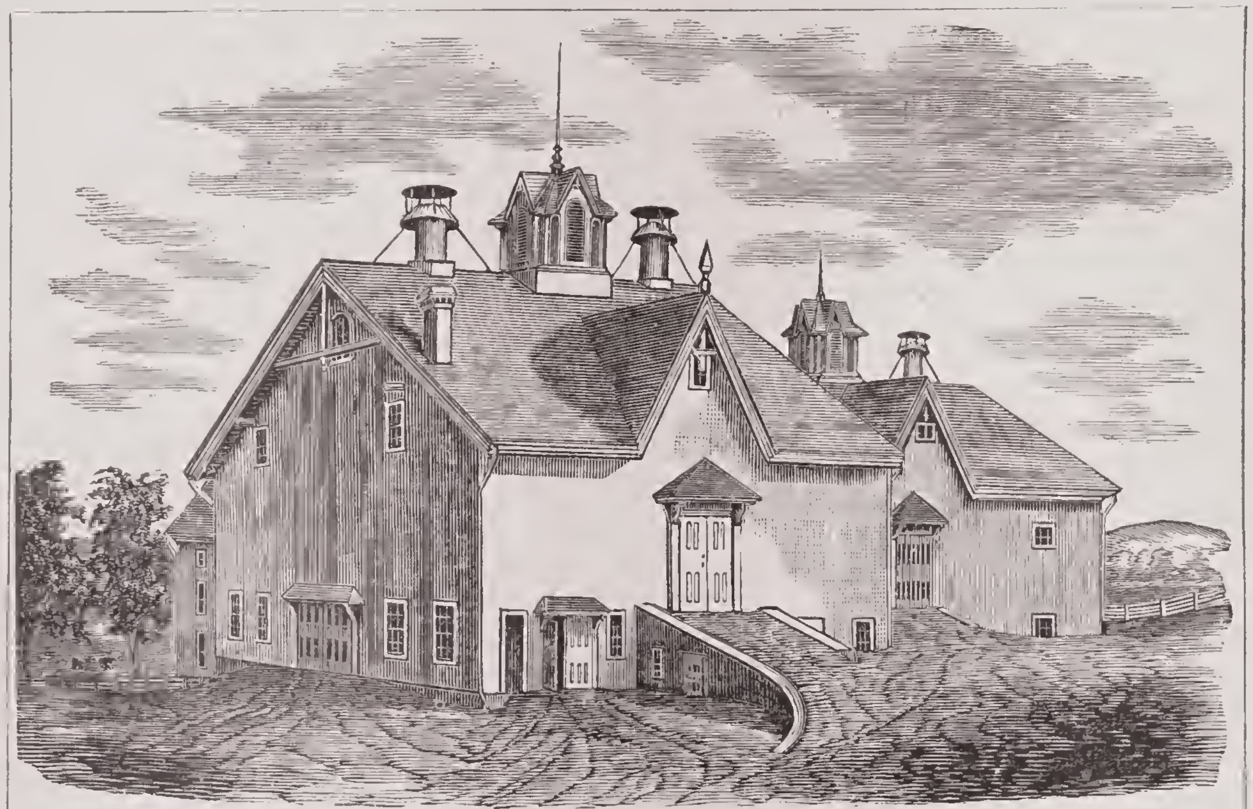


Fig. 25.—*Perspective of a Model Barn.*

The cow stalls are in the other wing, and are indicated by the words. To the rear of these are a row of stalls for calves. To the left of these, and shown by L, are two loose rooms, used for lying-in stables for cows. C R indicates a pen for calves, while H B, just across the hallway, is a large horse box. Near the point marked W F stand the hydrant for flowing water and the trough for mixing feed; and here, too, the shutes for cut feed and grain discharge from the floor above. E R indicates the engine room.

The plan of the hay floor is shown by Fig. 27. Here is where all the grain, hay and straw are stored. Two threshing floors cross the building, and are entered from the high ground on the west by a very easy ascent. The main entrance crosses over an engine room, seen in Fig. 25, and indicated by E R in Fig. 26. This room is built of stone, arched above, and is roomy as well as secure.

By means of a hay-fork and a number of travelers, the hay is taken from the loads and dropped in any part of the immense bays. The forks are worked by one horse, attached to a hoisting machine, of which there are two, placed near the great doors during the haying season.

On this floor are bins for grain and ground feed, as shown by G. These are provided with shutes connecting them with the main floor. There are also hay scales (S) on this floor. This affords the means of being very accurate in many things, in regard to which guess work is ordinarily the rule. The great ventilators, so conspicuous in Fig. 27. pass from the main floor to the roof, and are furnished with doors at different elevations, quite to the top of the mow, thus forming convenient shutes to throw down hay or straw. A long flight of stairs passes from the main floor to the cupola, from which a view may be obtained of the farm and surrounding country. V on this floor indicates ventilating trunks, of which there are four. A points to the stairs to the mow, B stairs to the cupola, and D stairs to the main floor.

The basement plan of the above design is given on the preceding page, while the main floor plan and that of the hay floor may be found on the following page. The plans very fully explain themselves, and any intelligent carpenter or builder will be able to follow them in the erection of a building. A barn of this style, only in a modified form,

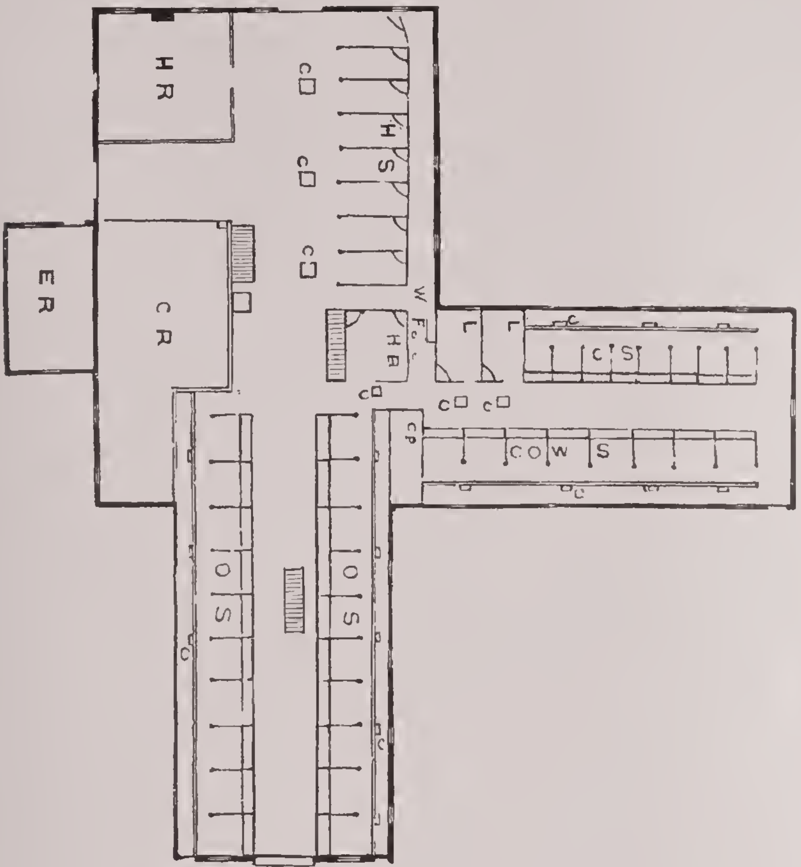


Fig. 26.—*Plan of Main Floor for Fig. 25.*

will be found to meet the wants of large farmers. In these days of railroads and near markets, huge barns are not as essential as formerly, yet many farms demand large buildings.

Fig. 28 represents a very convenient barn for its size and cost. It is 16 x 22 feet, and 14 feet high, with a wagon-shed across one end. This shed is 8 x 16 feet, and 7 feet high at the eaves. The first story of the barn is 8½ feet high; it contains a carriage-room, three good stalls with mangers and hay-shutes. There are two windows and double doors in front, and a single door at the back. The oat-bin is under the stairs; the grain is poured in at the top, and taken out at the bottom, the lower step being higher and broader than the others, and hinged. The upper floor is of inch-matched stuff, and the lower one, inch boards doubled, and laid to break joints, making a warmer floor than planks with cracks between them. The siding is of barn boards, dressed on one side, and battened with ½-inch by 2-inch battens; the cornice is with one-foot projections. The roof is of 18-inch clear, butt pine shingles. Total cost, including foundation and two coats of paint, $175.

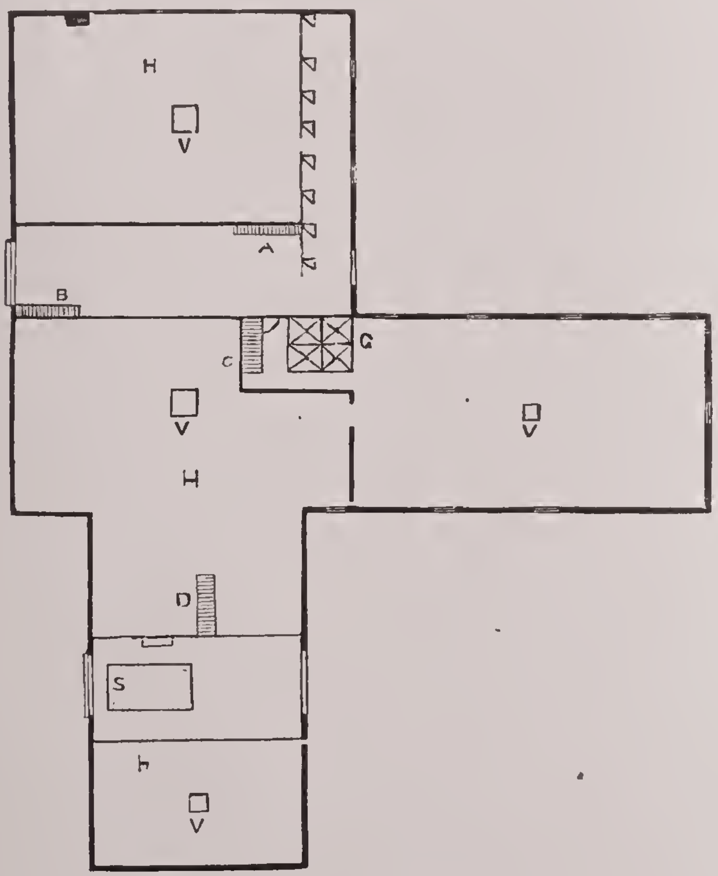


Fig. 27.—*Plan of Hay Floor of Fig. 25.*

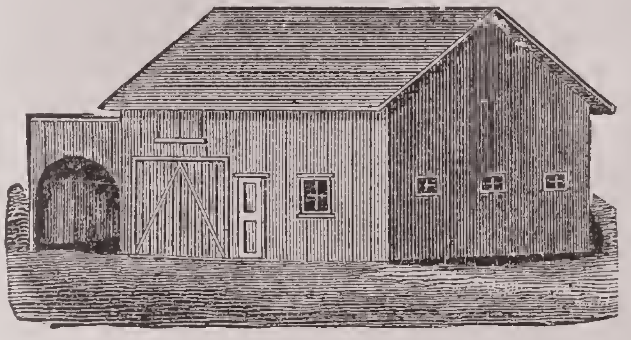


Fig. 28.—*Front Elevation of Barn.*

Sheep Barn. We give a design of an excellent sheep barn by Figs. 30 and 31. It is 40 x 90 feet in size. An alley seven feet wide runs lengthwise through the center, as indicated in Fig. 31. This is provided with a floor 2½ feet higher than the pens on either side. At either end of this alley is a sort of step-ladder leading to the hay loft. The joists over the alley are about 7 feet above it. At one corner of the chamber is a wool-room, and at the other a grain bin. The breadth given to the alley makes it convenient for feeding, and no hay gets on the sheep. In late spring this barn may be found a convenient place for young calves.

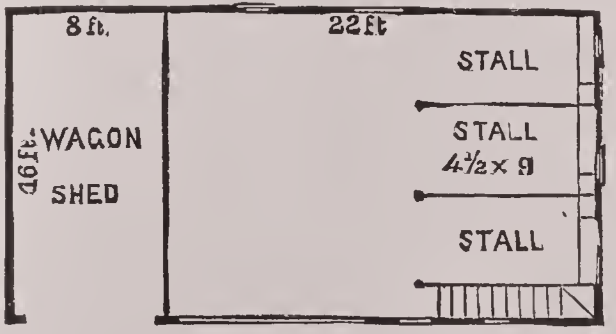


Fig. 29.—*Plan of Floor and Stalls.*

The floor over the pens and alley is all on the same level. Doors are placed on the sides of the building, opening into the loft, through which the hay is pitched. The gates open for the admission of wagon and team. In the ground plan g, g, g, represents the gates in the yards which flank the pens; d, d, d, doors between pens and yards; w, w, w, windows of pens, and t, t, t, water tanks.

Each pen has a low door entering from the alley, and also a door running into the adjoining pen. The sheep-rack forms the boundary of the pens. Water is supplied to each pen from a pipe below ground, and is pumped up by a windmill at some distance from the barn. The water is kept at a uniform level by means of a valve arranged in the reservoir. The back door passing into the yard from each pen is in two parts. The lower door is set in a groove at one edge, and is held to the other with a button. When not in use it is lifted out and set one side. The upper part of the door slides back on rollers above, and is on the outside of the barn. The upper one, when closed, permits a sheep to walk under it; or the lower one may be closed, and the upper open, when occupied by lambs. The pens are 12 x 16 feet, and the yards outside and adjoining are each 12 x 25 feet. The pens may be easily varied in width by moving the sheep-rack which divides them. To assist in readily supplying feed from the alley, a slanting board or door inclines toward the alley, and on this the hay or grain is placed on its way to the feeding trough below. These slanting doors are 2½ feet high, and are held in place by long hooks, *b*, at the top. In the summer these doors are set up vertically against the studs, *c* (which form the division between the pens and alley), and are held there by buttons.

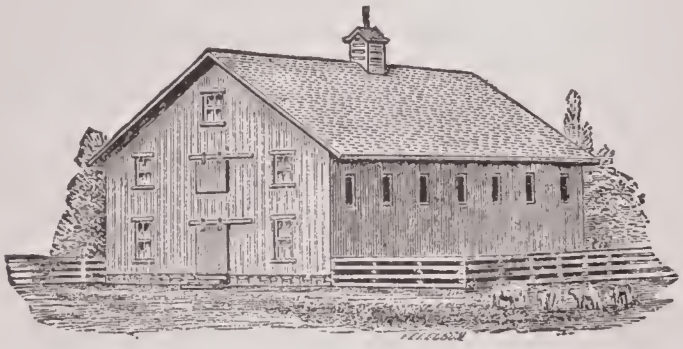


Fig. 30.—*Sheep Barn.*

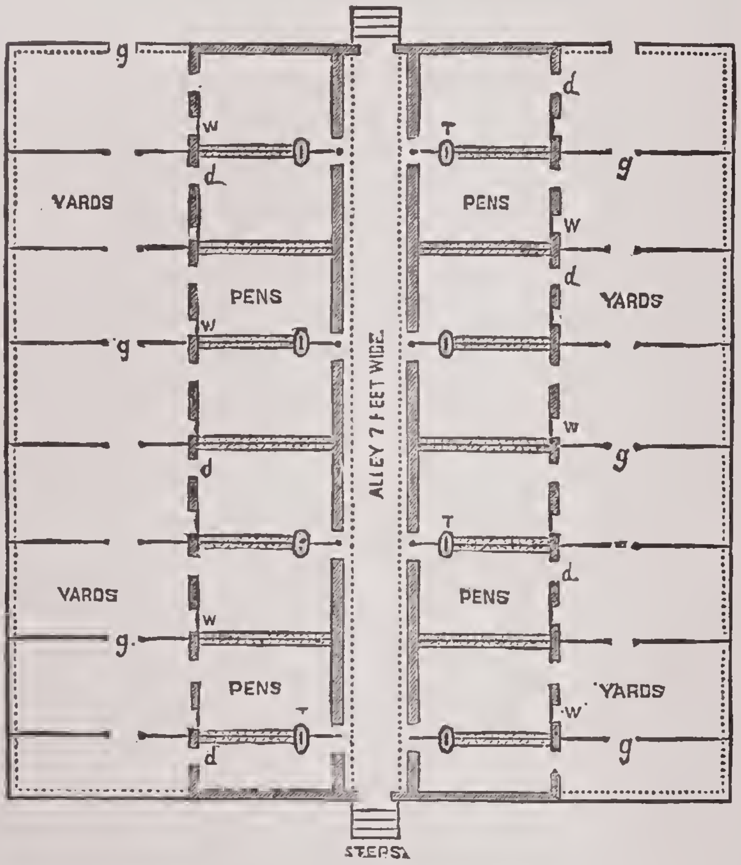


Fig. 31.—*Ground plan of Sheep Barn, Flanked by Yards.*

Barnacles, instruments used by farriers to put upon the muzzle of a horse when he will not stand quietly. The object of these instruments, and of another called the "twitch," is to produce as much pain in the muzzle as will draw away his attention from the pain caused by shoeing or surgical operation. The common barnacles are rollers of wood bound together and made to enclose and compress the muzzle. Another kind has handles, and operates like pinchers; and a third sort are held together at the top by a ring enclosing buttons. From inconsiderateness or cruelty much unnecessary pain is often inflicted with these instruments. In some instances even the highest degree of pain fails to accomplish the veterinary surgeon's purpose, so that he is obliged to have recourse to the strong means of restraint afforded by the side-line hobbles.

Barometer, an instrument which shows the weight of the atmosphere. In the common kind, the higher the mercury is in the glass tube, the heavier is the air. Allowance must always be made for variations of temperature and of height above the level of the sea. Ordinarily the air is heavier in clear weather than just before a storm, and the mercury correspondingly higher. The greatest and most sudden changes of the barometer generally take place in early summer, when the country is subject to violent storms. The instrument, as marked by opticians, with the words "fair," "change," "storm," etc., is often misleading. To foretell the weather correctly, several things must be considered: see Weather.

Barouche (ba-roosh′), a four-wheeled carriage, with a falling top, a seat on the outside for the driver, and two seats on the inside arranged for four persons to sit facing each other.

Bar-post, a post sunk in the ground to receive the bars of a passage into a field.

Barracan, a thick, strong stuff, somewhat like camlet; used for outer garments.

Barrel, of flour, is 196 pounds; of pork or rice, 200 pounds. Dry measure, a barrel contains 31½ gallons, which lacks but a half gallon of four bushels, even measure. In the South five bushels of corn, shelled, is sometimes called a barrel.

Barrel, of a boiler, is the cylindrical part, containing the flues.

Barren, not capable of producing fruit, or young; as, a barren tree; a barren cow.

Barrens, land not naturally covered with vegetation: often rich enough, however, for certain cultivated crops, fruit, plants, etc.

Barrow, a light, small carriage, borne or moved by hand; also, a hog, especially a male hog castrated; also, an artificial cave for keeping fruits and vegetables through the winter.

Bars, in farriery, are those portions of a horse's hoof which are turned inward and from the arches between the heels and the frog. The "bars" of a horse's mouth are the fleshy rows across the upper part, reaching almost to the palate. They form that part of the mouth on which the bit should rest and have its effect, the tongue of the curb bit pressing upon it when pulled by the reins.

Bar Shoe, a horse-shoe of particular construction, adapted to a tender foot and designed to protect a sore or weak point from pressure by causing the whole weight of the limb to be borne by the other portion of the sole. Its chief feature is a continuation of the common shoe around the heels, and its principal use is in cases of corn, sand-crack and pumiced feet; but it requires to be made thick; and it sometimes presses very injuriously on the heels.

Bar-way, a passage into a field composed of bars made to take out of the posts.

Base-court, the back-yard, or farm yard.

Basin. The basin of an apple, pear or peach is the depression or hollow at the blossom end, which is opposite the stem end of the fruit.

Basket, a vessel made of twigs, rushes, splinters or other flexible things, interwoven. Willow twigs are the usual material. Baskets are made in a great variety of shapes and sizes and styles, with reference to the innumerable purposes for which they are designed. In these days of cheap manufacture a farmer would not be justified in undertaking to make his baskets, but sometimes a young genius or an invalid of the household desires to while away a few tedious hours at this kind of work.

Bass, or **Bast**, the inner bark of the basswood or lin tree, easily torn, after soaking in water for about three months, into strips and shreds, which are useful for making mats, cordage, etc. It is the best material for ligatures in tying up vines and branches in horticulture, for binding grafts, buds, etc. The strips, being ribbon-form, are better for many purposes than cordage or twine.

Bassinet, a wicker basket with a covering or hood over one end, in which young children are placed as in a cradle.

Bat, a piece of a brick less than one-half of its length; also a heavy stick or club, especially a piece with one end heavier than the other. The other meanings of this word do not come within the scope of this work.

Bat, or **Batting**, a sheet of cotton prepared for filling quilts or comfortables.

Bath: see Hygiene, and Horse, Cattle, Sheep, etc., under the sub-head of Diseases.

Bath-brick, a preparation of chalky earth in the form of a brick, used for cleaning knives.

Battering-ram, a large beam carried endwise with great force against an object, in order to beat it down. Sometimes used, however, to jar nuts down from forest trees.

Bay, in a barn, is a low, enclosed place between the main floor and the end of the building, for the stowing of hay. As a color of horses, it is a kind of dark red, inclining to chestnut. A dark-tinted bay approaches a brown, but is more gay and shining. A bright bay horse is exceedingly beautiful, as he has a reddish tint with a clouded appearance, while the mane and tail are black, and his back has a dark stripe along the spine. Many horses of medium-colored bay have also black manes and tails and the dark stripe along the back. Most dark bay horses have their knees and pasterns black; and several kinds of bays have their whole limbs black from their knees or thighs down to their feet. Most bays which want the stripe along the back have a black color over the region of the kidneys, and this runs off by an imperceptible gradation to a light color toward the belly and flank. Some of these bays are inclined to be brown, and are more or less dappled. Horses of all the different shades of bay present a pleasing appearance; and unless they are spoiled by some accident when colts, they are generally well formed and healthy.

Bay Leaves, often used in seasoning food, are the leaves of the cherry laurel, valued for their bitter-almond flavor. Care should be taken not to use too much of this article, as it contains prussic acid, a virulent poison.

Bay Rum, a popular perfume distilled from the leaves of the bay plant. A good imitation can be made by mixing 10 drams of oil of bay, 1 dram of oil of pimento, 2 ounces of acetic ether, 3 gallons of alcohol and 2½ gallons of water, and after two weeks' standing, filtering it. A cheaper imitation is obtained by saturating ¼ pound block of magnesium carbonate with oil of bay, pulverizing, placing in a filter and pouring water through it; then add alcohol. Or, ½ dram bay oil in 1 ounce best alcohol 12 hours, then add a gill of cologne spirits and 15 ounces clear water.

Bay Window, one that forms a bay or recess in a room and projects outward from the wall: sometimes incorrectly called "bow" window.

Bead. To "draw a bead" is to take aim, with a gun: alluding to a small piece of metal used in taking aim, called the bead.

Beagle, a small hound, or hunting dog, formerly used in hunting hares.

Beak, in farriery, a little shoe, at the toe, about an inch long, turned up and fastened upon the fore part of the hoof.

Beaker, a large drinking-cup.

Beal, a small inflammatory tumor, or pustule.

Beam, of a plow, the main piece, to which the other parts of the plow and the team are attached; of an engine, the main lever, turning on a center and communicating power from the end of the pitman to the working-rod: called also "working-beam," or "walking-beam;" also, a heavy, square timber used in the frame of a building.

Beam-filling, the filling in of mason work between beams or joists.

Beans. Select light, warm soil, and plant when danger from frost is past, in drills two to two and a half feet apart, dropping the beans about two inches apart in the drill, and cover one inch deep. Keep the ground clean and loose by frequent hoeing, but do not draw the earth up to the plants. Avoid working among them when they are wet, as it will tend to make them rust. For vine or pole beans, set the poles three by three or four feet apart, and plant six to eight beans with the eyes downward around each pole, thinning to four healthy plants when they are up: otherwise cultivate as the bush or bunch bean. They crave a stronger soil, and do best in a sheltered situation. As a rule the dwarf varieties are the earliest and hardiest.

Three species of bean weevil exist, and one is fast spreading over the country. Late planting is a partial remedy, but the most effectual mode is to heat the beans as soon as harvested, to, say, 160° or 175°, for a few minutes, which will kill the bugs but not the vitality of the bean. The ash-grey blister beetle and the Virginia ermine moth sometimes infesting the bean, may be picked by hand and destroyed. Chickens catch these insects, but they also pick off the bean-blossoms, and do as much harm as good—sometimes more.

Cut-Worms, of which there are several species, are generally a dusty, gray, or drab color, and when grown, about an inch in length. They perform their work at night, not being able to stand the sun. The best time to find them is early in the morning before the sun makes its appearance. Remedies: Plow the land early in the fall, so that bluebird, robin and grakle may have a cut-worm feast before leaving for more genial climes. In garden work, syringe the plants with strong soap suds at the rate of three pounds of soap to 15 gallons of water. Pass along the field in the morning, cut the stock and discover the marauder and dig out and destroy with the hand, is the only sure method: see also Corn.

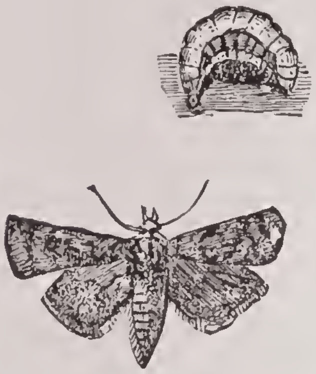


Fig. 1. *Cut-Worm.*

Green Beans may be dried for winter use, thus: Pick them while they are tender, cut the ends and strings from them, then put them in a pan of hot water and scald until they change color, then put them on papers and dry in the sun; take them in at night so they will not be subject to the dew. After they are dry, put them in a sack and hang where they will be kept perfectly dry. They want to be soaked over night before cooking. The same recipe is very nice for preparing peas for table use in winter. An old custom is to dry them in the shade, where the wind will strike them.

Varieties. Of the dwarf, snap, bush or bunch beans the following are the leading varieties:

Early China, or *Red-eye.* An old, popular, early variety.

Early Feejee. Very early, hardy and yields abundantly.

Early Valentine. Pod long, round and tender; an excellent, standard early bean for this latitude.

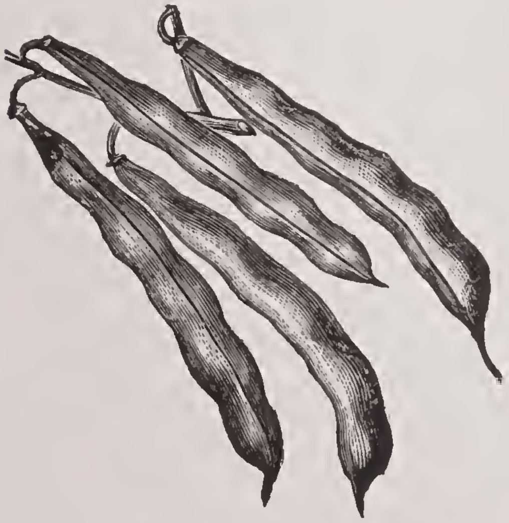


Fig. 2. *Red Speckled Valentine.*

Early Mohawk. Very hardy, early and productive.

Early Yellow Six-Weeks. A standard sort of the early variety.

Early Rachel. A long, straight-podded, early kind.

Dwarf Golden Wax, or *York Dwarf Wax.* A new variety which is extraordinarily prolific, and has very large beans and pods.

Rose. Another new and promising variety.

White Valentine. A new and excellent sort.

Red Speckled Valentine. This is a new variety, and gives promise of being a standard bean. The illustration (Fig. 2) very fairly represents it.

Dwarf German Wax, the long variety. Considered more productive than the round sort. This bean is a great favorite with almost every one.

Dwarf German Wax, the round variety. White pods, beans pure white, very early; first-rate.

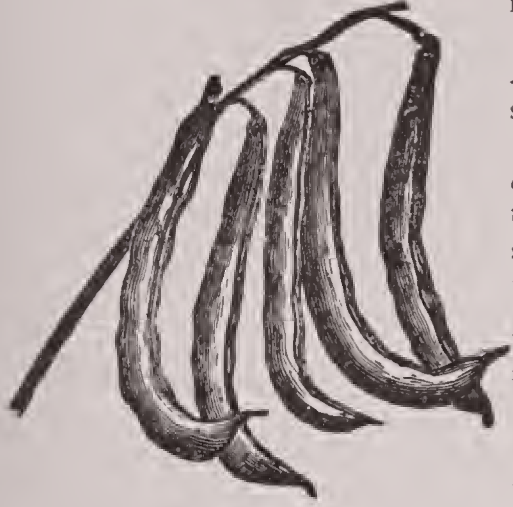


FIG. 3. *Southern Prolific Beans.*

White Wax. An excellent new snap-short.

Dun Cranberry. One of the very best for stringing; yield first-rate; early; good either as a green or dry shell-bean.

Refugee, or *Thousand to One.* Very prolific.

Intermediate Horticultural. A half-bush variety, very prolific; an excellent substitute for the pole horticultural; a superior sort for market gardeners.

Improved Yellow-Eye. One of the best varieties for baking; remarkably healthy, vigorous and prolific.

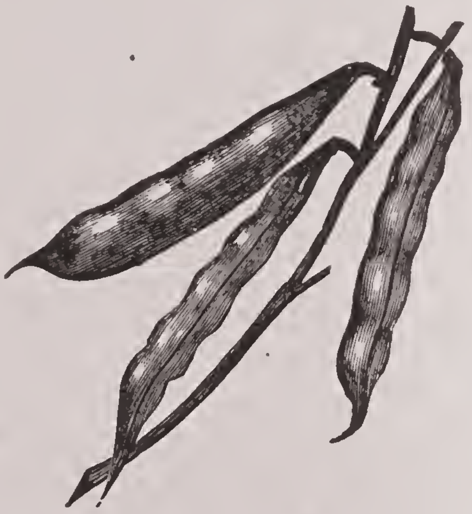


FIG. 4. *Golden Wax Bush Beans.*

Concord Bush. A fine variety.

True White Pea Bean. Fine for baking; beans round as peas.

Navy or *Pea Bean.* A standard sort for field culture; almost round; very productive.

White Medium. A white bush variety largely used by the government.

White Marrow. Early; a standard sort for field cultivation.

Red Kidney. A standard red sort.

Of the POLE, or running varieties, the following are recommended:

Large Lima. Surpasses all other shell beans in quality, but requires a longer season than we have in the Northwest.

Dreer's Improved Lima. Rather later but more prolific than large.

Mottled Cranberry. Long-podded; very productive and popular.

London Horticultural, or *Wren's Egg.* Pods elegantly striped; excellent for string or shell; productive.

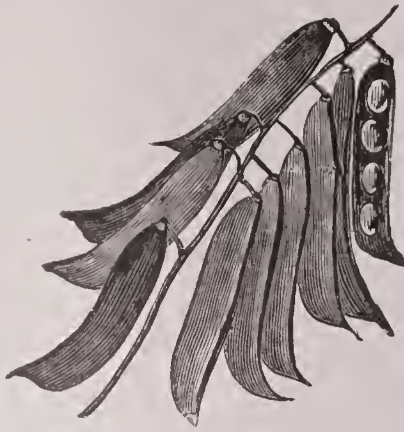


FIG. 5. *Carolina Pole Beans.*

Early Lima, Sieva, or *Frost Bean.* Two weeks earlier than large Lima, but requires the entire season in this latitude.

Rhode Island Butter. One of the very best to eat green-shelled.

Golden Butter. A new French wax bean resembling the Indian Chief, but is a better bearer and the pods are rather longer; early.

Yellow-Podded White Wax. Stringless; surpasses the Giant Wax in earliness and productiveness.

Marblehead Champion. Earliest of all; a string bean.

Caroline Pole Bean. New, prolific.

Kentucky Wonder. A snap bean; the most productive of all; pods nearly a foot long.

Lamberson's White. A good, prolific snap bean; color white.

Indian Chief, or *Black Algerian.* Always in order for stringing; pods yellowish white and almost transparent.

Boston Market Pole Cranberry. Standard; very prolific.

Concord. Resembles the Horticultural but takes to the pole better, is earlier, healthy and prolific; good as string or shell.

Case-Knife. A white bean of great richness.

Giant Wax. Always a snap bean; never stringy; pods yellowish white, very long and remarkably tender.

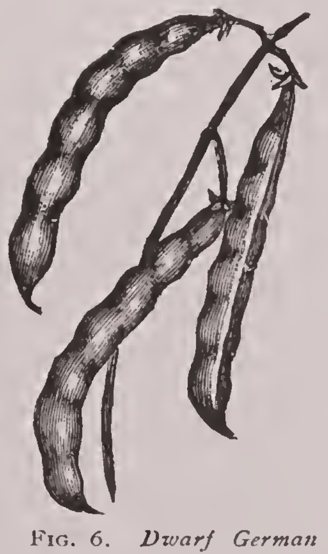


FIG. 6. *Dwarf German Wax Bush Beans.*

Southern Prolific Bean. The best pole bean.

White Pole Cranberry. A capital late variety, particularly as a string bean; a little tender.

Painted Lady. Either for ornament or use.

Broad Winsor. A large and excellent English bean, which should be planted two or three weeks earlier than the common bean, in rows two feet apart and six inches apart in the row; covering two inches deep. Pinch off the tops of the plants when the young pods first appear.

BEANS, TO COOK. *String Beans.* Break off both ends and string carefully; if necessary pare both edges with a knife. Cut the beans in pieces an inch long and put in cold water a few minutes. Drain and put them into boiling water with a piece of bacon or salt pork. Boil quickly for half an hour, or till tender. Drain in a colander and dish with plenty of butter.

Boiled Beans. In preparing dry beans for the table, they should be first soaked in water or parboiled, and the water drained from them, else they will taste rank. Use a large quantity of water, and pour it off when the beans have fully swelled, and finish cooking them in fresh water. If meat is cooked with them, it should first be boiled nearly done in a separate pot, and then put in with the beans. Bean soup is made by finishing off a mess of boiled beans in a large quantity of water, either with the meat soup or milk added. For this purpose, mashing the softened beans is a great aid. Some also pass them through a colander, to take the skins out. Black pepper is the only aromatic admissible in a dish of beans.

Baked Beans. First parboil them as above described, put in a piece of pork, bacon or suet, with a little pepper, and bake in a steady oven for several hours. Basting may be required to prevent the beans on the surface from drying and becoming hard. Saleratus, a teaspoonful to the quart of beans, dissolved in them before baking, greatly improves them.

Lima Beans. Shell them into cold water; let them lie half an hour or longer, put them into a saucepan with plenty of boiling water, a little salt, and cook till tender. Drain and butter well and pepper to taste.

Another: Put a pint of shelled beans in boiling, salted water, enough to cover. Cook until tender, then drain them. Melt a piece of butter the size of an egg, and mix an even tablespoonful of flour with it; add a little meat broth to make a smooth sauce, or use water instead. Put the beans in the sauce and set them at the side of the fire for fifteen minutes. Just before serving add a tablespoonful of chopped parsley, and season to taste with salt and pepper.

Pork and Beans. Take one pint of long white winter beans and boil them in water until done, and then have ready some fat sliced pork as if to fry; fresh pork, peppered and salted, or pickled side soaked in cold water over night; place the beans in a baking dish, put the meat on the beans, and bake until the meat is done.

Bear, in commercial parlance, is one who contracts to deliver, at a specified future time, stocks which he does not own; a "bull" is one who contracts to take them. Hence, in the intervening time, it is the interest of the former to depress stocks, as the bear pulls down with his strong paws, and of the latter to raise stocks, as the bull throws upward with his horns. The stock is, in fact, never delivered, and was never meant to be. When the time for delivery arrives, the losing party pays the difference between the price of the stock then and at the time when the contract was made. The whole transaction is therefore a species of gambling, and has but a temporary influence upon the markets.

Beard. Some men do not pay sufficient attention to their beard. Almost any man's beard and whiskers look much better for being trimmed; by this we mean the cutting off of all straggling locks and hairs, leaving the beard in a smooth, neat form. The principle, indeed, does not differ at all from what we are supposed to observe in trimming the hair of the head. As to any particular shape to wear the beard and whiskers, the rules and conditions are too prolix for enumeration here. The general practice is to let the beard grow wherever it is naturally inclined to grow heaviest, and to shave the other portions of the beard surface. Of course it is understood that, considered as a nice point in physiology, all the beard should be permitted to grow, at least, that all the beard surface should be covered with its natural covering; but there is no use whatever in carrying about with you loose and straggling portions, which project so far out from the face as to be no protection to it, and still less an ornament. The heavy and long mustache, so much in fashion at the present day, looks well, but it is an obstacle to clean eating and drinking.

We have no confidence in any of the vaunted remedies for "making the beard grow." For dyes, see Hair Dyes.

To shave properly, always wash the beard well with soap and clear cold water, and rub it dry before applying the razor to it; then apply the lather, and the more you use the better; never use warm water, for by doing so you make a tender face. The best time to shave is in the morning just after the bath: see also Razor.

Bearing, the surface exposed to friction, as at the journals of machinery, or "spindles" of a wagon.

Beat. A horse is said to "beat the dust" when he takes in too little ground with his fore feet, or when he performs his curvets too precipitately or too slow. To "beat the hoof," is to walk, or go on foot. A stag is said to "beat up and down" when he runs first one way and then the other.

Beaufet (bo′fet), a niche, cupboard or sideboard for plate, china, glass, etc.; a buffet.

Beaver, as the name of a species of woolen cloth, signifies a heavy kind, generally felted, and used for making overcoats, hats, etc.

Beaverteen, a kind of fustian made of coarse twilled cotton, shorn after dyeing.

Bed, in machinery, is the foundation on which a machine rests.

Bed. BEDSTEAD. Many new styles of bedsteads and mattresses are offered to the public,—too numerous to mention here. The best we can do is to indicate the general principles of a good bedstead. Certain points are apt to be left too weak by the manufacturers, as the fastenings at the ends of the side-rails, the support for the mattress frame, freedom from harbors for vermin, etc. Metallic bedsteads, although costing more at first, are generally preferred, on account of the ease with which they can be kept free from vermin. Ordinary slat bottoms generally have the slats too far apart. It would be better to have a continuous floor for a bottom. Several varieties of folding bedsteads are in use. Those which close up with all the bedding contained are liable to the serious objection that they prevent an airing of the clothes, but they are convenient where the room allowed for a bed is limited. Cots, hammocks and lounge, or sofa, bedsteads are economical conveniences of considerable value.

BEDDING. 1. *The Mattress.* Many substances have been used for the filling of mattresses and ticks, as feathers, hair of different animals, cork shavings, corn husks, straw, sea-weed, moss, leaves, various vegetable fibers, hay, wire springs, etc. Feathers are unhealthful; and as to the other articles used, the choice may be left to the taste and idiosyncrasies. 2. *Covers.* The American method of sleeping with cotton sheets next the body, and in cold weather with woolen blankets or comforters next outside these, seems to be the best system, in a hygienic point of view. All other matters on this head can be safely left to the taste and fancy of individuals. See also Sleeping.

Bed-bugs. Cleanliness is an important thing in keeping out these pests. It is important that bed-rooms have no cracks or crevices where the bugs can lurk and lay their eggs. There should not be in bed-rooms piles of old rags, paper or any thing that harbors dirt or secretes vermin. Anything of this sort promotes the fecundity and growth of bed-bugs. Besides being kept always sweet and clean, every part of a bedstead and bedroom should be exposed and accessible, so that the first appearance of the pests can be noticed and acted upon. Vigilance on the part of a housekeeper, even in an old domicile, will do much toward keeping the pests at bay, and eventually exterminating them. Particular care should be taken in early spring. As early as March and April a careful examination of beds and all harbors for the eggs of bugs should be made, and there should be a thorough cleansing of the bed-room furniture. To kill the bugs and their eggs, use either of the following preparations: 1. Mix together 2 ounces of camphor, 4 ounces spirits turpentine, 1 ounce corrosive sublimate, and one pint alcohol. 2. Distilled vinegar, or diluted good vinegar, a pint; camphor, ½ ounce; dissolve. 3. White arsenic, 2 ounces; lard, 13 ounces; corrosive sublimate, ¼ ounce; Venetian red, ¼ ounce (deadly poison). 4. Strong mercurial ointment, 1 ounce; soft soap, 1 ounce; oil of turpentine, a pint. 5. Gasoline or benzine and coal oil are excellent adjuncts, with cleanliness, in ridding a bed of these pests. 6. When they have a lodgment in the wall, fill all the apertures with a mixture of soft soap and Scotch snuff. 7. A strong decoction of red pepper applied to bedsteads will either kill or drive them away. 8. Take lamp-oil, to which add 10 cents worth of quicksilver. Put it into all the cracks around the bed, and the bugs will soon disappear. First, the bedstead should be scalded and wiped dry, and the mixture put on with a feather. 9. Quicksilver mixed with the white of an egg serves the same purpose as the above. 10. Rub the bedstead in the joints with equal parts of turpentine and kerosene oil, and the cracks of the surface, in rooms where there are many. 11. Persian insect powder. 12. Several more innocent remedies are recommended, as tomato vines and leaves, and other herbs. 13. Re-painting and varnishing is a thorough and effectual method. Fill all crevices with putty or hard soap.

To destroy bed bugs in papered rooms, clean the paint of the room thoroughly, and set in the middle of the room a dish containing 4 ounces of brimstone. Light it and close the room as tight as possible, stopping the key-hole of the door with paper, to keep the fumes of the brimstone in the room. Let it remain for three or four hours, then open the windows and air thoroughly. The brimstone will be found to have also bleached the paint if it is of a yellowish white.

Bed-chamber. Sweet, clean, airy bed-chambers are a luxury. Every room occupied during the night should be thrown open to the freest exposure of sun and air the next morning. The clothes should be thrown down from the bed, mattress turned over, and window opened from both top and bottom, and left so one-half hour at least. The element of thoroughness is one of the best points in a good chamber-maid. Through and through, from the dusting of the walls and ceiling and the bed-slats on sweeping days, to the wiping off the picture on the bureau or brushing up the hearth each morning, thoroughness should be the motto. Mirrors can be cleaned with a soft cloth dipped in alcohol. Linseed oil and vinegar boiled together make a very good furniture polish. There is a little bug that infests matting which nothing but constant vigilance will destroy, killing every one. Such bugs are effectually killed by turpentine. In furnishing bed-chambers, artistic taste demands that paper for the walls and paint for the woodwork should harmonize in color and design. For rooms used chiefly in winter, dark colors are suitable. For summer apartments, lighter shades are desirable, and while in large rooms large patterns are not out of place, in smaller sized rooms the figure of the paper should correspond. It requires a high ceiling for a high dado and deep frieze to look well, while some flitting butterfly or delicate flower pattern gives a summer airiness to the country chamber. Patterns in wall-papers, as in most other things, change in fashion, and the curious figures and landscapes of thirty years ago are now never seen. Within the last five or six years decorative art has been the rage, and wall papers have received due attention. For a short time plain, deep-colored paper was much in vogue, with a gilt band as frieze. Now more elaborate artistic patterns are in use.

The furniture of the chamber ought of course to be in keeping with the rest of the house, and fashion prescribes regular sets. Some will vary to suit their own convenience. If it is required to use the room as a sitting-room during the day, sofa and other furniture beds can be obtained, at all prices, from ten dollars to one hundred and fifty dollars, though unless the room is really needed it is better to use the chamber for a sleeping apartment only, thus giving plenty of opportunity for the room and bedding to be well aired during the day.

Bed-pan, a vessel shaped for the convenient use of a bed-ridden patient in making water. To be had at drug or crockery stores.

Bed-sores, running sores caused by keeping the bed, as an invalid, for a long time. Treatment: Gently press out the pus, wash the part, and then cover with collodion; when this is dry, fix over it some soft lint or cotton. Or, wash several times a day with a lotion of 1 tablespoonful of powdered alum to 1 teacupful of whisky. Or, apply the white of egg well beaten and mixed with spirits of wine.

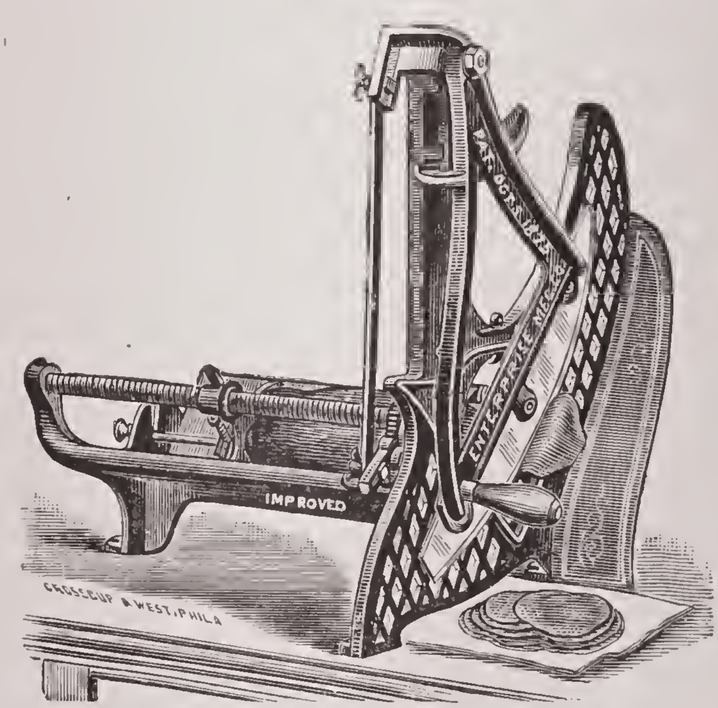
Beech, a forest tree of the oak family. Very abundant in the Eastern United States as far west as Lake Michigan; west of that line it is not found.

Beef. To Fatten Beef: see Cattle and Fattening. The parts of a beef are named in the article Carving.

To Cure Beef. Boil in 4 gallons of water 2 pounds of brown sugar, 3 ounces of saltpeter and 10 pounds of salt until all is dissolved; skim as fast as the skum rises. Pack the meat closely in a barrel and when the brine is quite cold, pour it on the meat. The above quantity of brine is sufficient for 200 pounds of beef. If dried beef is wanted, pieces may be taken from the pickle in five or six weeks and smoked.

To Dry Beef, cut into slices from 2 to 6 ounces in weight, boil for five or six minutes in just water enough to cover the meat. Lay it in a drying stove, keeping the temperature at about 122° Fahr. In about two days the meat will be completely dry, having lost two-thirds its weight. Add a little salt and spice, especially coriander, to the liquor or soup in which the meat was immersed, and then evaporate it to a gelatinous consistence. When the flesh is perfectly dry, dip it, piece by piece, in the gelatinous matter liquefied by a gentle heat, and replace it in the stove to dry, repeating this varnishing and drying two or three times, so as to get the coating uniformly thick. Meat dried in this way will keep for more than a year.

To Smoke Beef, expose the meat previously salted to wood smoke, in a smoke house, into which the smoke is admitted by flues at the bottom of the side walls. The meat absorbs the pyroligneous acid of the smoke and is dried at the same time. It can be protected from soot by rubbing over with bran or wrapping with a cloth. The smoke from oak or beech wood is preferable, and the smoking is better slow and gentle than rapid and powerful. When the beef is once smoked or dried a beef-cutter is very convenient. We give an illustration of one made by the Enterprise Manufacturing Company, of Philadelphia.



Smoked-Beef Cutter.

The knife is suspended pendulum-like, and with each stroke cuts a slice clean, clear and quickly, taking but a few moments to shave down a pound of beef. Green or soft beef can be shaved equally well. The automatic feed can be regulated to cut from shavings as thin as tissue to slices one-eighth of an inch thick. It is also adapted to slicing potatoes, fruits, and vegetables of all kinds.

To Keep Fresh, place the meat on a wooden support (or suspend it), in a close vessel, on the bottom of which some strong acetic acid has been poured.

Marbled Beef is that in which the fat and lean are intermingled in streaks and spots, so that its cut surface presents a mottled or marbled appearance. It is produced by beeves of delicate structure, and the art of producing it has not yet been brought under the control of man. Whether a given animal will produce such beef cannot be foretold with certainty.

Beef Tea. To make beef tea, cut a pound of fresh beef into thin slices, simmer with a quart of water 20 minutes; after it has once boiled and been skimmed, season, if approved. Still another method is to cut lean, tender beef into small pieces, put them into a bottle without water, cork and set into a pot of cold water; then put on the stove and boil for one hour. Season to taste.

To Boil Beef. Reckon the time from the water coming to a boil. Keep the pot boiling, but let it boil very slowly. If you let the pot cease boiling you will be deceived in your time; therefore watch that it does not stop, and keep up a good fire. Just before the pot boils the scum rises. Be sure to skim it off carefully, or it will fall back and adhere to the meat and disfigure it sadly. When you have well skimmed the pot, put in a little cold water, which will cause the scum to rise again. The more carefully you skim the cleaner and nicer the meat boiled will look. Put your meat in cold water; a quart of cold water to every pound of meat. Allow 20 minutes to the pound from the time the pot boils and the scum rises. It is more profitable to boil than to roast meat.

Beef a la Mode. Take a piece of meat (cross-rib is the best); put a slice of bacon or some lard in the bottom of the pot, then the meat, and fill up with water till the meat is covered; then take two onions, some peppercorns, cloves, bay leaves, one carrot, and a crust of brown bread, salt and some vinegar; throw all this in over the beef; keep the pot well covered; fill up with more hot water if it boils down, and let it boil three hours; then parch a tablespoonful of flour, with some butter, a nice brown, thin with the gravy, and let it boil up once more with the meat; then put the meat in a deep dish and strain the gravy over it; add more vinegar to taste; serve with fried potatoes and red cabbage.

Boiled Corned Beef. Wash it well, put it in a pot, and if very salt, cover well with cold water; if only slightly corned, use boiling water; skim often while boiling, and allow at least half an hour for every pound of meat. If it is to be eaten cold, do not remove as soon as done, but allow it to remain in the liquor until nearly cold; then lay it in an earthen dish with a piece of board upon it, and press with a stone or a couple of flat-irons.

Savory Beef. Take a shin of beef from the hind quarter, saw it into four pieces, put it into a pot, and boil it until the meat and gristle drop from the bones; chop the meat very fine, put it in a dish, and season it with a little salt, pepper, cloves and sage, to your taste; pour in the liquor in which the meat was boiled, and place it away to harden; cut in slices and serve cold.

Beef-Steak. The tender-loin is the best piece for broiling. A steak from the round or shoulder clod is good, and comes cheaper. If the beef is not very tender, it should be laid on a board and pounded, before broiling or frying it. Wash it in cold water, then lay it on a gridiron, place it on a hot bed of coals, and broil it as quick as possible, without burning it. If broiled slow, it will not be good. It takes from 15 to 20 minutes to broil a steak. For seven or eight pounds of beef, cut up about a quarter of a pound of butter. Heat the platter very hot that the steak is to be put on, lay the butter on it, take up the steak, salt and pepper it on both sides. Beef-steak, to be good, should be eaten as soon as cooked. A few slices of salt pork broiled with the steak makes a rich gravy with a very little butter. There should always be a trough to catch the juice of the meat when broiled. The same pieces that are good broiled are good for frying. Fry a few slices of salt pork brown, then take them up and put in the beef. When brown on both sides, take it up, take the pan off the fire, to let the fat cool; when cool, turn in half a teacup of water, mix a couple of teaspoonfuls of flour with a little water, stir it into the fat, put the pan back on the fire, stir it till it boils up, then turn it over the beef.

Roast Beef. The tender-loin, the first and second cuts off the rack, are the best roasting pieces: the third and fourth cuts are good. When the meat is put to the fire, a little salt should be sprinkled on it, and the bony side turned toward the fire first. When the bones get well heated through, turn the meat, and keep a brisk fire: baste it frequently while roasting. There should be a tablespoonful of water put into the dripping pan when the meat is put down to roast. If it is a thick piece, allow 15 minutes to each pound to roast it in; if thin, less time will be required. A piece that seems a little dry or tough should be first steamed half an hour, by putting it into a dripping-pan with half a pint of water and turned over occasionally.

Sirloins and ribs of beef are very extravagant joints from the weight of bone. The roasting side of the round part of the buttock, and the part called the "top-side," are the most profitable for family eating. The mouse buttock is used for stewing; shin is used for soup or stewing.

Beef Stew. Take three pounds of beef, navel piece is the best, cut in inch-square pieces; peel and slice four or five onions; put a layer of meat in the bottom of the pot, then a layer of onions, and so on until used up; season each layer with pepper and salt; cover with boiling water, boil slowly and keep the pot covered. Peel a quart of potatoes, cut into small pieces; add the potatoes about half an hour before serving.

Beef Stewed with Onions. Cut two pounds of tender beef into small pieces, season with pepper and salt; slice one or two onions and add to it, with water enough to make a gravy; let it stew slowly till the beef is thoroughly cooked, then add some pieces of butter rolled in flour, enough to make a rich gravy. Cold beef may be cooked in the same way, but the onions must then be cooked before adding them to the meat. Add more boiling water if it dries too fast.

Minced Beef. Mince about a pound and a half of beef with six ounces of bacon and two onions, seasoning it highly with pepper and nutmeg. Take a sufficient quantity of stock made from bones, and any trimmings, a piece of butter rolled in flour, and a little browning; make it hot and strain it over the mince; put the whole into a stewpan, let it simmer for a few minutes, and serve it on a hot dish with sippets of toasted bread, and a poached or hard-boiled egg divided and placed on each sippet arranged round the edge of the dish. It is also served surrounded by a wall of mashed potatoes, with two poached eggs lying on the top of it.

To Dress Cold Beef. Mince it fine with pepper, salt and onions, and some rich gravy, and put it into scollop-tins three-fourths full; fill them up with mashed potatoes and brown in the oven.

Beef Balls or Patties. Take a piece of beef boiled tender, chop it very finely with an onion, season with salt and pepper, add parsley, bread crumbs, lemon peel and grated nutmeg; moisten it with an egg, mix well together, and roll it into balls, or roll out and cut into shapes like apple puffs. Then dip them in flour and fry them in boiling lard or fresh dripping. Serve them with thickened brown gravy, or fried bread crumbs.

Spiced Corned Beef. For a rump of beef weighing 30 pounds, from which the bones have been taken, use 1 ounce saltpeter, 1 pint sugar, and 1 pint salt. Pulverize the saltpeter and mix with ½ teacup sugar and ½ teacup salt. Rub this thoroughly into the beef, cutting it so that it may penetrate well. Let it lie 24 hours. Mix the rest of the sugar and salt and rub well over the beef. Then turn and rub with the brine that is made, every day for 10 days. Take it out and drain for 24 hours. Mix 3 tablespoonfuls black pepper, 1 ounce cloves, 1½ ounces allspice, 1½ ounces cinnamon, 1 nutmeg. Rub this well into the beef and tie it up. To do this, roll it tightly and wind with twine, fastening it every round, which should be about 1½ inches apart. It is ready for use in two or three days. To cook, shave very thin, and throw into a hot spider in which is a piece of butter, and cook only long enough to change the color. For variety break a fresh egg, and stir in with the meat when cooking.

Beef Tongue (corned or smoked). Soak the tongue twenty-four hours before boiling. It will require from three to four hours, according to size. The skin should always be removed as soon as it is taken from the pot. An economical method is to lay the tongue, as soon as the skin is removed, in a jar, coiled up with the tip outside the root, and a weight upon it. When it is cold, loosen the sides with a knife, and turn it out.

Beef Liver. Slice the liver and pour boiling water over it; wipe dry and cut it into very small pieces. Fry slices of fat, salt pork until brown; take out the pork and fry the liver in the fat; cook thoroughly. When done pour a little water over the liver and thicken with a little flour and water, mixed smooth. Salt to taste.

Calf's Head, Boiled. Let the butcher split the head in halves. Take out the eyes and the snout bone; then lay it in cold water to soak, two hours before boiling; take out the brains and wash them well in several waters, then lay them in cold water. Put the head together, and lay it in a good-sized pot; cover it with cold water, and throw in a tablespoonful of salt; let it boil slowly for two or three hours. When it has boiled a little more than an hour, take about a quart of the liquor, and put into a stewpan for the gravy; add to it some salt, pepper, a little parsley chopped fine, a tablespoonful of lemon pickle, and then boil. Beat up an egg lightly, with two tablespoonfuls of flour, then remove carefully the skin from the brains, and beat them up with the egg and flour. When well beaten thicken the gravy with it, and stew about ten minutes.

Calf's Liver and Bacon. Soak two or three livers in cold water for half an hour, then dry it in a cloth, and cut it into thin, narrow slices; take about a pound of bacon, or as much as you may require, and cut an equal number of thin slices as you have of liver; fry the bacon lightly, take it out and keep it hot; then fry the liver in the same pan, seasoning it with pepper and salt, and dredge over it a little flour. When it is a nice brown, arrange it round the dish with a roll of bacon between each slice. Pour off the fat from the pan, put in about two ounces of butter well rubbed in flour to thicken the gravy; squeeze in the juice of a lemon and add a cupful of hot water; boil it, and pour into the center of the dish. Serve it garnished with forcemeat balls or slices of lemon.

Bee-keeping is not only a source of profit, but also affords the greatest pleasure to those who become interested in the science. There is a fascination about the apiary which is indescribable. The instincts and habits of the bee are so inexplicable and marvelous, that those who study it are continually surprised with new and attractive revelations. Those who are quick to observe, and are cautious and prompt, may, with almost certain success, make bee culture a specialty. Every farmer should devote a portion of his time to the art, and provide his own table, at least, with the delicious and wholesome sweet furnished by the apiary. While the following article is sufficiently full and elaborate to instruct the beginner in the science of apiculture, yet the developments in the art are so rapid that it becomes necessary for one to keep constantly posted. A journal devoted to apiculture should be perused by one who expects to make a success of bee-keeping, and we feel that the *Weekly Bee Journal* of Chicago, Ill., is one to be recommended.

From a financial standpoint bee-keeping as a specialty is a most profitable occupation. The comparatively small amount of capital required, the relatively small amount of labor and expense attending its operation, and the abundant reward to those who follow it intelligently, should attract the attention of many farmers who would make excellent and successful bee-keepers. We are largely indebted to Mr. Thomas G. Newman, editor and publisher of the *American Bee Journal*, Chicago, Ill., for the information contained in this article. Mr. Newman takes a particular interest in bee culture, and he is now recognized authority on all matters relating to the science; and few men in America have a greater fund of practical knowledge of this fascinating art than he.

THE QUEEN. A "colony" of bees contains a fertile queen, thirty to forty thousand workers, and in some seasons a few hundred of drones. The queen is the only perfect female in the colony, and is the mother of it. Her only duty is to lay the eggs for the propagation of the species. She is a little larger around the body than the worker, but not as large as the drone. Her body is longer than the worker, but her wings are only about two-thirds of the length of the body, her abdomen gradually tapering to a point. She has a sting, but uses it only upon royalty. Her development is as follows: Having passed three days in the egg and five in the larval state, the workers close the cell, and the future queen commences to spin her cocoon, which occupies about a day. Then, apparently exhausted by her labors, for three days she obtains complete repose, and on the sixteenth day, as a perfect queen, she emerges from the cell. The strength of the colony and the character of the season may vary it a day or so.

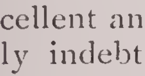


FIG. 1. *Larva of Bee.*

When the embryo queen is nearly mature, within twelve to sixteen hours of emerging, the bees begin to demolish the exterior compartment, or extension of the top of the cell, reducing it to a level with the outer edge of the cap of the cell proper. The convex cap, being then very prominent, is very liable to be injured, and to protect it from injury the bees coat it with a fresh layer of wax, making it nearly as thick as the walls of the cell. The young queen pierces a hole through the edge of the cover with her mandibles, and then makes a circular cut along its periphery. Being nearly detached from the cell walls, the cap drops, opening a circular passage through which the young queen emerges.

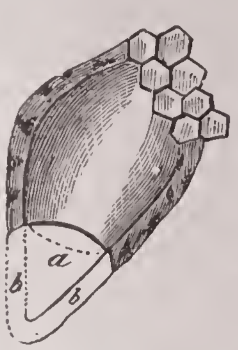


FIG. 2.—*Finished Queen Cell, sealed over.*

a, convex cap; *b*, *b*, the extension of the cell.

From the egg to the queen emerging from the cell, takes sixteen days. She is then a virgin queen, and for five or six days she moves around in much the same manner as a worker bee, helping herself to honey from uncapped cells.

About the fifth day, if the weather is pleasant, she may be seen crawling about the entrance of the hive, and if the next day is propitious, she may try her wings some from the alighting board. She will appear somewhat excited, but after awhile she will mount up and circle around, increasing the distance each time, to mark the hive and insure a safe return from her wedding flight.

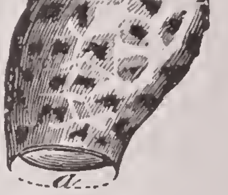


FIG. 3.—*Ripe Queen Cell, with the exterior compartment removed.*

a. the convex cap.

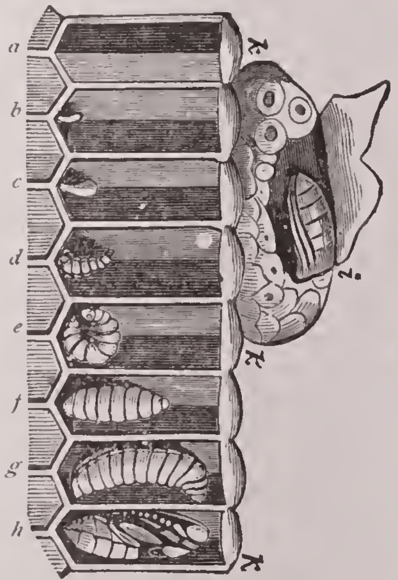


FIG. 4.—*Eggs and Brood.*

a, empty cell; *b* and *c*, eggs; *d*, *e*, *f* and *g*, various stages of the larvæ; *h*, pupa; *i*, pupa of queen in queen cell; *k*, *k*, caps.

In the warmest part of the afternoon, she will spread her beautiful wings and soar into the air to mate with a drone. If successful she will bear the marks of it on her return; if not, she will, after a time, on the same day, come out again and again, until it is accomplished. She will then return, and in a day or two she will commence to lay, so that, generally, from eight to nine days after emerging from the cell, the queens are laying. Should the weather be unfavorable, and she fails to meet the drone within about twenty days, she will have failed in the object of her existence, and become only a drone producer. Once becoming such she is so for life, though she often lives three or four years. On her return to the hive, after meeting the drones, if she has been fecundated, the male organs may be seen attached to her abdomen. In about two days after thus mating with the drone she will commence to lay eggs, and she is capable of laying two thousand or more eggs per day.

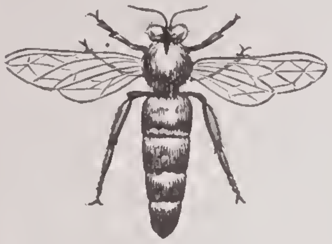


Fig. 5.—*The Queen Bee, magnified.*

Instinct teaches the workers the necessity of having a queen that is prolific, and should she become barren from any cause, or be lost, they immediately prepare to raise another to take her place. This they do by building queen cells, and if, when these are about one-half completed, the queen has not deposited eggs in any of them, they take eggs from worker cells and supply them. By feeding the embryo queen with royal jelly, the egg that would have produced a worker, had it remained in a worker cell, becomes a queen.

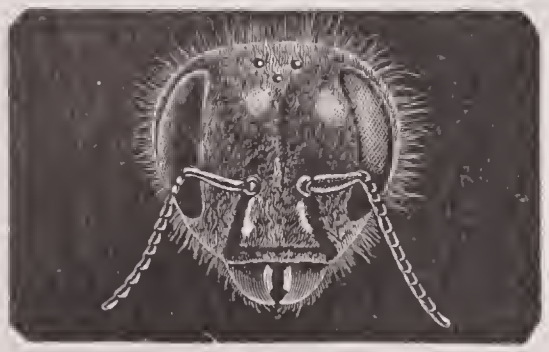


Fig. 6.—*Head of Queen, magnified.*

The queen usually lays from February to October, but early in the spring she lays sparingly. When fruit and flowers bloom, and the bees are getting honey and pollen, she lays more rapidly. An unimpregnated queen is called a "virgin queen." They are capable of laying only drone eggs. A fertile queen is one which has mated with a drone, and is capable of laying eggs which may become either workers, drones or queens. A barren queen is one who has passed the stage of laying eggs that will become either workers or queens, but continues to lay eggs which produce only drones. The period of fertility lasts from two to three years, and cannot be depended on longer safely. All such queens should be destroyed and fertile ones introduced, that the colony may not become extinct.

Drones. These are non-producers, and live on the toil and industry of others. They are the males, and have no sting; neither have they any means of gathering honey or secreting wax, or doing any work that is even necessary to their own support, or the common good of the colony.

The drones are shorter, thicker and more bulky than the queen, and their wings reach the entire length of their body. They are much larger and clumsier than the workers, and are covered with a short but fine hair. Their buzzing when on the wing is much louder, and differs from the others. Their only use is to serve the queen when on her " bridal trip."

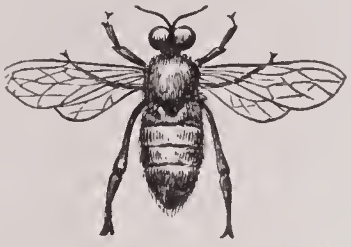


Fig. 7.—*The Drone Bee, magnified.*

Not more than one in a thousand is ever privileged to perform that duty, but as the queen's life is very valuable, and the dangers surrounding her flight are numerous, it is necessary to have a sufficient number of them, in order that her absence from the hive may not be protracted. After mating she returns to the hive a fertile queen for life.

The drone in the act of copulation loses his life, dying instantly. At the approach of the swarming season they are reared to fertilize the young queens; after that is accomplished, they are mercilessly destroyed by the workers.

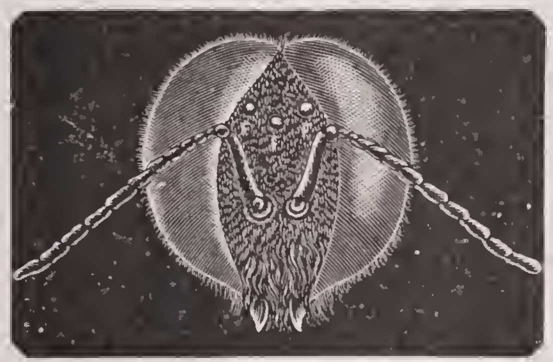


Fig. 8.—*Head of Drone, magnified.*

Should a colony lose its queen, the drones will be retained later; instinct teaching them that without the drone, the young queen would remain unfertilized, and the colony soon become extinct. The youth history of the drone is this: He passes three days in the egg, about six and a half in the larval state, and changes into a perfect drone in twenty-four or twenty-five days, counting from the egg.

Workers. These are undeveloped females, and they do all the work that is done in the hive. They secrete the wax, build the comb, gather the pollen for the young, and honey for all; feed and rear the brood, and fight all the battles necessary to defend the colony.

Of the three kinds of bees, these are the smallest, but constitute the great mass of the population. They possess the whole ruling power of the colony and regulate its economy.

The worker, after passing about three and a half days in the egg, is hatched—a small white worm, grub or maggot—and is called larva (a Latin word signifying a mask, for the bee is concealed or hidden in that state). It remains in this state about five days and then the bees seal the cell over; the larva then spins around itself a silken covering, called a cocoon, which occupies about thirty-six hours. In this third stage it is called a nympha, pupa or chrysalis, in which state it remains until the twenty-first day, counting from the time the egg was laid, when it emerges from the cell a perfect working bee, and is called an imago.

The cocoon, left behind, forms a lining to the cell, and for this reason it is best not to use the same breeding comb too long, for each cocoon left behind, imperceptibly, but not the less really, diminishes the size of the cell for its future occupant, and prevents the bees from attaining their full development of size.

When the weather is cool or the colony weak, the development is retarded to a greater or less extent; the heat should be above 70° Fahr. for the best results. Both the workers and the drones, on emerging from the cells, are rather helpless, and are soft, downy, and light in color.

The workers and drones spin complete cocoons, inclosing themselves perfectly, but queens inclose only the head, thorax, and first ring of the abdomen—evidently to provide for the means of being destroyed by a rival queen, before emerging from the cell, should it become desirable to do so.

The workers are provided with a sack or honey-bag; there is a small cavity on their posterior legs, in which they store the pollen of flowers in very small lumps, being the most convenient form in which to carry it home. They are also provided with a sting, which they use only for defense.

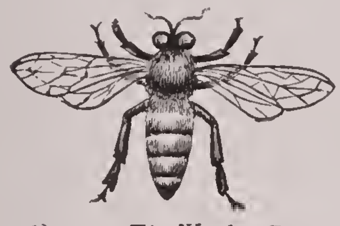


Fig. 9.—*The Worker Bee, magnified.*

They gather honey, which is a secretion in many flowers; pollen, which is the farina of various plants, and which is largely used in forming bee-bread; and also propolis, or bee-glue, a resinous substance that is used in fastening the combs to the sides of hives, and to fill cracks or open places.

Many persons entertain the idea that the worker bees live many years. Their conclusion is drawn from the fact that colonies inhabit the same hive for a long period; but the natural life of the worker honey bee does not exceed six months, and from recent experiments it is ascertained that it does not exceed six or eight weeks in the height of the honey season. Those reared in the fall, having little out-door work to perform, will live till the spring. None of them die of old age, but the majority work themselves to death, and many are killed through other causes.

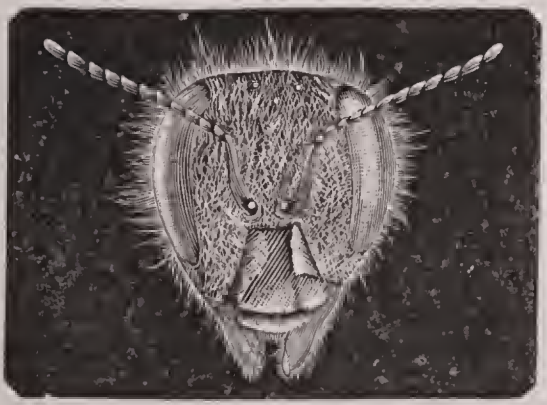


Fig. 10.—*Head of Worker, magnified.*

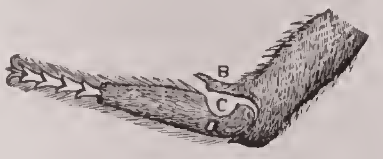


Fig. 11.—*Anterior Leg of Worker, magnified.*

Brood. The egg is laid by the queen, in the bottom of the cell; in three days it hatches into a small, white worm, called larva, which, being fed by the bees, increases rapidly in size; when this larva nearly fills the cell, it is closed up by the bees. The time usually taken for this process is eight days for the worker, or queen, and nine and a half days for the drone.

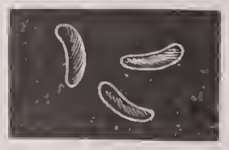


Fig. 12.—*Eggs.*

The workers will develop from the egg in twenty-one days, gathering honey from about sixteen days after emerging from the cell. The drones will hatch in twenty-four days, and if the weather is propitious they will "fly" in a few days after. The queens mature in sixteen days, and are able to fly in a few hours after emerging from the cell.

Until the seventeenth day the workers seem only to be fit for the work of the hive. Before that age they seldom leave the hive, their labors being confined to the building of the comb, nursing the brood, feeding the larvæ, capping brood and honey cells, etc.

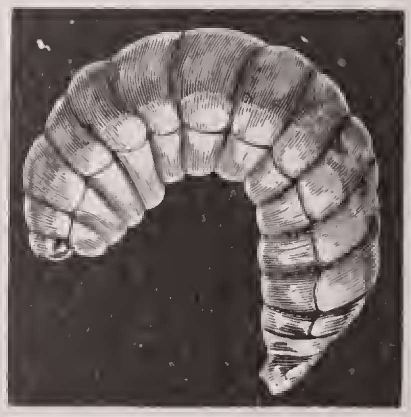


Fig. 13.—*Brood.*

Apiary. The next thing in importance is the location of the apiary. Select, if possible, a sheltered place, shaded somewhat by trees, with an eastern or southern aspect, where they can be easily seen or heard from the house during swarming season. As regards the distance between the stands, it should be as great as circumstances will admit, two feet being the nearest they should be placed. Get a location where fruit and flowers abound, and where white clover and linden or basswood also flourish. Almost anywhere within the United States will be good.

Some use saw-dust under and around the hives, to prevent the springing up of grass to the annoyance of the bees. Some use sand or gravel for the same object, with success.

A timber range is very desirable, for a large portion of their honey and pollen they gather from timber and shrubs. Many good localities are found near rivers or streamlets, where linden, sumac, maple, willow, cottonwood, and other

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A timber range is very desirable, for a large portion of their honey and pollen they gather from timber and shrubs. Many good localities are found near rivers or streamlets, where linden, sumach, maple, willow, cottonwood, and other trees, shrubs and vines that yield honey and pollen abound. The bees should be near the house, or where they can be heard when they swarm. They should be so located that the north and west winds would not strike them, where they can have a warm, calm place to alight. A hedge, high board-fence, or building, on the north and west, are a protection against the strong winds which destroy very many laboring bees in the spring, when one bee is worth as much as a dozen in the latter part of summer, as they are then much needed to care for the brood and keep it warm. If, in April, the day has been rather warm and the evening cool and windy, hundreds of bees may be found on the ground in front of the hive, perhaps loaded with pollen, but exhausted from the flight and chilled with cold. As they approach the hive they relax their exertions, and a light whiff of wind dashes them to the ground, from which they are unable to arise, and before the sun could warm them up, the next morning, they will be dead. If you have no shade for your bees, it would be best to plant fruit trees among them. These would not only supply them with pollen and honey in blooming time, but acceptable shade in hot summer days. Another thing is apparent, *i. e.*, the fruit would be a remuneration. The bees would fructify the trees and make them bear plentifully, while in return the trees would afford to the bees that shade which they so much require, from the burning rays of the sun. There seems to be no facing superior to the one that allows the sun's rays to shine directly into the entrance of a hive at 11:30 a. m. There is not a difference of any consequence between a south, southeast or southwest aspect, and selection may be made to suit the apiarist's notion. Next to this, we should say, face to the east; if this is impossible, then west, and when no other is available, submit to a north frontage.

When to Commence. The reason why many are unsuccessful is that they commence at the wrong time. It may have been noticed that about every third year has been a poor season for bees. After such a season but few will commence; while, if the next is a good one, many think the matter worthy of their attention, and if this is followed by another prosperous year, they then decide to embark. But alas! that is just the time to meet the third year's reverse. Those, therefore, who engage in the business should not be discouraged at one reverse.

Early in the spring is the best time to begin, and thus secure an increase of bees as well as honey the first year. Purchase a colony from some reliable breeder or dealer, and in order to get experience, increase from one or two colonies, not more. As it is essential to know what to do and when to do it, and how to do it, we cannot too strongly advise the beginner to purchase a good manual of the apiary, and study it well. This is absolutely essential to success.

Removing Bees. After procuring the bees and selecting the location and position in the apiary, the next thing is to know when and how to remove the bees. In the spring or fall will be the best time to remove them. In the hot weather the combs may be broken down in transit, and general ruin may be the result. In September or October they may be removed with safety, but the best time to begin an apiary is in April or May. Only strong colonies should be purchased, unless nuclei colonies are desired in the spring to build up into strong ones by the fall. If the distance is less than half a mile, they should be removed late in the fall, or the purchaser may lose heavily by the bees going back to their old location. It is necessary, however, for their health, that shortly after completing their journey they should have one or two fine days on which they can go out and relieve themselves. The disturbance created by transport causes every bee to fill itself with honey, and the condition thereby induced is unfavorable to lengthened confinement. We can always calculate on a fine day occurring after a short interval in the fall, but one suitable for bee flight may not happen in winter till after the lapse of several weeks. If bees eat freely, and are constrained by an inclement atmosphere to remain long within their hives, evil consequences follow. This is what sometimes causes destruction to colonies moved in winter.

What Kind of Bees to Get. Some prefer to purchase black bees in box hives, and then transfer them to movable frame hives in order to get experience. In that case, they should be populous colonies with the comb yellow or brown. Then the honey received will help to pay for the cost of transferring. The best satisfaction may be obtained by purchasing strong Italian colonies in the spring. Such will, doubtless, in a few seasons, pay for themselves, thus proving the cheapest in the end, though a little more outlay is required at first. One such colony is worth two of the former. To examine a box hive, incline it to one side, looking from the bottom up, between the combs. By using a smoker, the bees may be driven back, and one may discover if it has capped brood, larvæ and plenty of bees. It should have such, to be considered in good condition.

BUYING "SWARMS." A first swarm is always to be preferred, and if possible from a hive that swarmed the previous year, for then the old queen will be in her second year, vigorous and at her best. A small, second swarm should be passed by, in purchasing. Arrange the frames 1⅜ inches from center to center; tilt the hive forward at an angle of 20 to 25 degrees, and they will be almost certain to build straight on the comb-guides. If an old hive is purchased, let it be a heavy one in the spring, with straight comb coming entirely down to the bottom of the frames.

HOW TO CARE FOR A FIRST COLONY. If it comes by express or freight, from a dealer or bee-raiser, take it home carefully in a spring wagon. Be sure that the combs run lengthwise of the wagon; drive slowly and handle with care. Place the hive in the position you wish it to occupy, and let it remain till evening, when the wire cloth that is usually nailed over the entrance may be removed, and some board or other obstacle placed in front of the hive, so that when the bees come out in the morning, they will circle around and mark the location, before going to their work, and thus return in due time with safety. About mid-day, it may be well to open the hive and see whether any combs are broken down, and if so, get them straightened up, and fastened either with twine or wire, until the bees have secured them, when such fastenings should be removed. Be sure to smoke them well, before opening the hive.

It is desirable not to change the location of hives, unless it becomes absolutely necessary to do so. After the bees have become familiar with their location, should the hive be moved a few feet they will not notice it when departing on their daily rounds, and if there are other hives near they may perish in attempting to enter other hives or in wandering about, seeking their own home.

When it becomes necessary to move the hives, it should be done gradually, not exceeding the breadth of the hive each day. Or if they are to be moved several rods, alarm them by smoke blown into the entrance, then close it, and remove, placing some obstacle before the hive previous to opening the entrance again. In moving half a mile or more, the result is different; they note the new locality and return to it. Be sure to give plenty of room in time for the honey season. Place the additional boxes near the brood combs, and if necessary introduce a little comb with uncapped brood in it, so that the bees may enter them. If they will not enter them, some other arrangement must be adopted, such as long hives, or half or full upper stories, in which frames may be placed.

PREPARATION OF BEES FOR WINTER. The conditions for out-door wintering with success, are: Strong colonies, secured by late breeding, 30 pounds of good, capped honey, and vigorous queens. If hives are packed with good, dry, absorbing material, with an air space of two or three inches below them, and an opportunity given for the moisture generated by the bees to gradually pass off, without permitting a draft of air through the hives, there will be no trouble with them, either in winter or spring.

When hives are set about a foot apart, upon low stands, they may be protected by driving stakes on both sides of them (front and rear) and at the ends; and then fill in compactly all around them with hay or straw, two or three inches thick, with a temporary roof of boards to keep the straw dry. This protection is sufficient for any latitude, however cold it may be, and enables the bees to winter with as little loss generally as occurs under any other system. The passage-ways to the hives must not be obstructed by the straw, as bees require an occasional flight in mild weather. Another way is to have cheap, outside boxes made, open at both ends, which are to be placed over the hives, and the open space (two or three inches) on each side filled with straw, packed in firmly. A hole in each box, cut out in front of the openings in the hives, having something placed in it to keep the passage-way from being shut up with straw, will afford the bees egress and ingress, when it is safe to allow them to take a flight.

The requirements to winter bees in cellars are, dryness and darkness, with the thermometer ranging from 35 to 45 degrees, prolific queens, 30 pounds of good, capped honey (no glucose, nor uncapped honey that will ferment), a quilt over the frames to absorb the moisture, and a free passage for air all around and below the hives, to prevent dampness, and a ventilator running to the bottom of the cellar, to carry off the impure air. If the combs contain uncapped honey, it should be extracted. If the requisite amount of suitable honey is not at hand, feed good, thick honey which has been extracted early in the season; or, if that cannot be had, make a sirup of coffee A sugar, of the consistency of honey, or just so that it will not crystallize upon cooling. Perhaps the most convenient method of feeding this is to put it in a bag made of drilling, which is tacked to a strip of wood like the top bar of a frame except that it is two inches wide, and has a hole cut in the center one inch wide and two inches long. Hang this between the frames and the end of the hive, and pour in the honey or sirup. The bees will sip it up and store it away as it oozes through the feeder. This feeding should be done as early at least as the last of September, so the bees will have time to cap the cells before the weather becomes too cold. But it is impossible to have just such air in a cellar as bees have in their native wild state, and hence, with even the utmost pains, we must suffer some loss. The truth in a nut-shell, with regard to wintering bees, appears to be this: Confine the bees to as small a space as they can crowd into, with a plenty of good food, pure air, warmth and dryness.

Some seasons are so unfavorable that it is impossible to have good stock for wintering, as for instance the summer of 1880 in the Northwestern States. The following table shows the subsequent loss, as well as a comparison of the various methods of keeping:

	No. in Fall.	Dead.	Per cent. of Loss.
In bee houses.	15,863	3,299	.21
In cellars............	91,171	29,734	.32
Protected	145,883	67,238	.46
Total	252,917	100,271	.39
Unprotected	268,313	229,741	.85
Grand Total.....	521,230	330,012	.63

Spring Management. During the latter part of March and first of April, when the weather is warm, set the bees out, toward evening. Setting them out in the morning gets them excited and may cause them all to leave their hives and collect into one great "swarm." At this time it is recommended to take a clean, dry hive and set it down beside the first hive, into which blow a little smoke. Carefully open the hive and begin at one side to take out the combs, and if any are wet and moldy, clean them off as well as you can, and put them into the dry hive, taking away the old hive and putting the other in its place. If you have no more empty hives, clean out No. 1, and set it in the sun to dry. Go to No. 2, and if you find the combs all dry and no dead bees on the bottom of the hive, close it up, and in this way go through all; for by doing so, you see exactly what condition they are in, and then work accordingly. Every spring, till the bees begin to gather natural pollen, put some flour and meal (though rye and oats ground together is better) into a cover or shallow box, setting it a little slanting in some sheltered corner, and if you are not troubled with your neighbors' bees, a little well diluted honey will do them good, even if they have plenty of honey in the hives. The hives should not be placed on their stands until all danger of severe freezing weather is past, as the change from the warm cellar to a cold atmosphere is too great, and liability to spring dwindling is the result.

Hives. Experience has demonstrated that the Langstroth hive is the best of all that have been introduced. In the spring of 1881, Mr. Newman, editor of the *American Bee Journal*, incurred considerable expense to ascertain which sort stood best the severe test of the winter of 1880–1, with the following results:

How Wintered.	No. in Fall.	Dead.	Per cent. of Loss.
Box hives	211,732	187,705	.89
All frame hives......	309,498	142,307	.46
Langstroth	195,957	83,965	.42
Other frames.........	113,541	58,342	.51
Grand Total.....	521,230	330,012	.63

This table tells its own story, in very plain words.

The Langstroth frame is now very generally used all over the United States, and will doubtless ere long supplant all others. The beginner, therefore, can do no better than to adopt it.

The Langstroth hive is peculiarly adapted for the production of comb honey; its honey rack (Fig. 14) is the best in use, and perfectly adapted to the use of the prize boxes. It holds 18 prize boxes, with the separators between them, marked B, B, in the cut. The wedge A holds all with a vise-like grasp. The outer boxes, C, C, C, are glassed as they stand on the hive. By removing the wedge A any box may be instantly removed, examined, returned, or replaced by an empty one, the spaces between the rows readily admitting the fingers for that purpose.

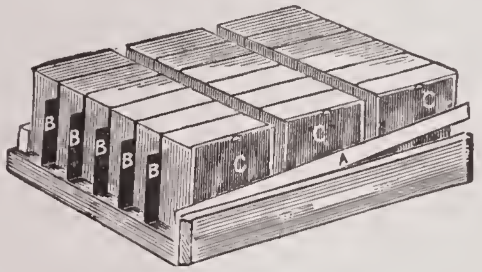


Fig. 14.—*Comb-Honey Rack.*

How to Procure the Best Comb Honey. Not only should we forsake the log-gums and rude straw and box hives of our fathers, and give these busy little workers a neater home with movable frames to contain their combs, but we should teach them to store their surplus honey in small sectional frames and boxes (Figs. 15, 16, 17) so that it can be easily taken from the hives when full, and marketed in convenient shape, suited to the requirements of retail purchasers.

This box (Fig. 15) is 5¼ x 6¼ inches outside; the sides are ⅛ of an inch thick and 2 inches wide, while the top and bottom are ¼ of an inch thick, and 1¾ inches wide, the whole weighing but 2 ounces. It is the favorite box for marketing comb honey, and is made so that it can be glassed or not, as may be demanded by the market. Honey in this box was awarded the Thurber Gold Medal, in New York, October, 1877, by the National Bee-Keepers' Convention, then in session at Cooper's Institute; and honey in this box everywhere commands the highest market prices.

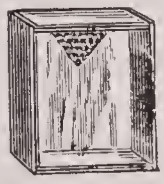


Fig. 15.—*The Prize Honey Box.*

The top and bottom being narrower allows room for the glass, and when put on the hive, the space being then doubled by two boxes coming together, leaves ample means of ingress and egress for the bees.

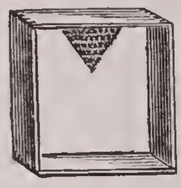


Fig. 16.—*Prize Honey Box, not Glassed.*

The dove-tailed section (Fig. 16) is made of the same thickness at both top and sides, being about three-sixteenths of an inch, and being dove-tailed, can be put together without nailing. The objection to them is that they are much weaker than those nailed; and if it becomes necessary to nail them, there is no economy in their use. They are intended to be used *without* glass. These are made of basswood, and are all in one piece, as will be seen by the illustration, with grooves cut so that they may be bent to the proper shape.

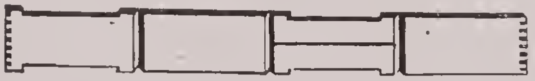


Fig. 17.—*Honey Sections all in one piece.*

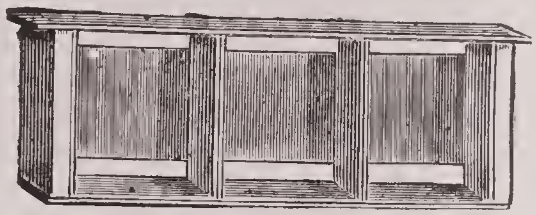


Fig. 18.—*Case of Prize Boxes for Langstroth Hive.*

This case (Fig. 18) is made of ¼-inch lumber, 2 inches wide, and holds three prize boxes. Such an arrangement must have a seven-inch story made for it, which may be lifted on and off the hive in one piece. It holds 21 prize boxes, and is used with success by many. Fig. 18 shows the tin separators on the back, one of which is attached to every case. This story and cases being a part of the hive, only the boxes are sold with the honey.

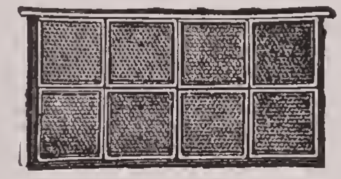


Fig. 19.—*Case of Eight Small Sections.*

The cut (Fig. 19) shows a case made similar to the above, but of the ordinary size of a Langstroth frame, and holds eight small sections with tin separators between them. Such sections are too small to be practical.

These are used, one on each side of the brood chamber, to induce the bees to start surplus storing early. When commenced, if one has a second story of the same size as the breeding apartment, these may be placed in the center of it to induce the bees to go up there and work.

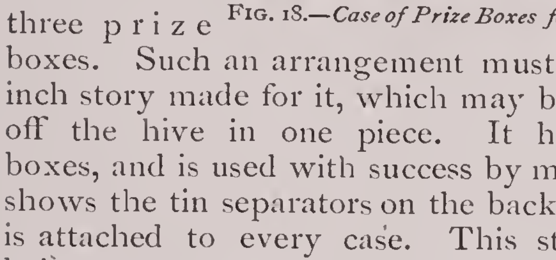


Fig. 20.—*Shipping Crate to contain 12 Prize Boxes.*

The favorite shipping crate is that shown in Fig. 20; and honey packed in it is a staple article in cities, especially in the East. It holds one dozen of the before mentioned prize boxes, or two-pound sections (Figs. 15, 16, 17), and is a very convenient and attractive way of putting comb honey upon the market. Either the "crate" or the "boxes" may be glassed, to protect the honey from the dust of a retail store, and preserve it in its original condition for the consumer's use.

Prize boxes with a tight top-bar (2 inches wide) are used in the comb-honey rack (Fig. 14); those used in cases (Fig. 18) have the top and bottom bars only 1¾ inches wide; the case being two inches in width, prevents any bees from going above it.

To glass the boxes, two tin points (Fig. 21) should be inserted in the top bar of the section, ⅛ of an inch from the edge, and the same in the bottom bar. Between these the glass may be inserted, bending down the tin points closely to it; the sides being full 2 inches in width, while the top and bottom are ⅛ of an inch less on either side, the glass will just make all even, nice and attractive.

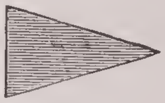


Fig. 21. *Tin Points for Glassing Boxes.*

The glass may be taken off at pleasure, by simply straightening up the tin points. Some persons paste paper over the joints, to keep the package air-tight. However desirable the latter may be, the paper is a positive detriment, for it soon becomes covered with fly-specks and dirt, rendering it unattractive to the purchaser.

The above directions are for those used in cases (Fig. 18). Those with the tight top-bar, used in the comb-honey rack (Fig. 14), have to be fastened with the tin points at the bottom, as before described, and at the top by having a tin point inserted outside of the glass.

Making Hives and Surplus Boxes. To save trouble and annoyance in making hives, boxes, etc., it is best to get them cut, and ready to nail together. Should you intend to make them at home, a foot-power saw will be very essential in order to saw the material for hives, frames and boxes, so as to exactly fit.

The stands upon which the hives are set should be as near the ground as can be made safe from dirt and vermin.

The illustrations given in this connection are taken from goods in the bee-keeper's supply house of Alfred H. Newman, 972 Madison street, Chicago, Ill.

Comb Foundation and its Use. It is estimated that the workers have to consume about 20 pounds of honey, to be able to construct one pound of comb. This being true, 1 pound of comb is equal in value to 20 pounds of honey. If, therefore, honey is worth 15 cents per pound, comb costs $3 per pound, when produced by the bees. From this we may learn the value of comb foundation when supplied to the bees.

The comb foundation (Fig. 22) consists of sheets of wax, obtained by dipping wooden or metal plates into melted wax, and upon being rolled through a machine (Fig. 23), indentations are made on both sides that form the foundation of cells, which the bees readily accept, thin out, and work into comb. These corrugations are made to correspond both with the worker and drone cells, the latter being used for starters in boxes for surplus honey. Fig. 24 shows the rhombs, pyramidal bases and cross-sections of cells. Comb foundation, when held up to the light, shows all these very plainly.

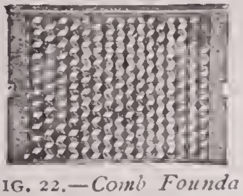


FIG. 22.—*Comb Foundation.*

As a result of several experiments, we will note the following: A brood frame being filled with comb foundation in the evening, was examined the next morning, and showed that in 12 hours about half of it had the cells built out sufficient for the queen to lay in them, which she had done. In 24 hours the comb was filled with eggs and the elongation of the cells was rapidly going on. Within 8 days, 10 combs had been built out, filled with worker brood, and sealed over. Only a very few cells had been filled with honey. The beautiful and regularly built comb, with its thousands of little inhabitants, was marvelous indeed! To prevent sagging and bulging, it should not touch the bottom or sides; it being better to leave ½ an inch of space on either side and an inch at the bottom.

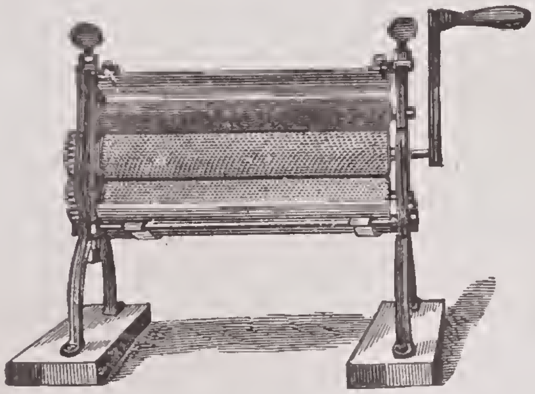


FIG. 23.—*Machine for making Comb Foundation.*

Bees bred in new comb are generally much larger than those raised in old. The cells in the old comb become smaller every year, as every bee that is hatched in them leaves its silky cocoon adhering to the walls of the cell, thus diminishing its size and consequently the size of the bee. When drones are bred in worker-cells (not uncommon) they are stunted in their growth. To raise a queen the cell is enlarged, and the larva that would, if left in a smaller cell, have been a worker, becomes increased in bulk, and being fed on royal jelly, hatches out a queen. It is safe to say that if an enlarged cell was not necessary to the enlarged size, the bees would not so uniformly require the building of large queen cells.

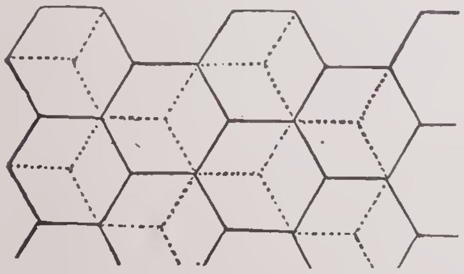


FIG. 24.—*Bases and Cross Sections of Cells.*

Comb foundation may be fastened by rubbing the edge hard against the wood of the top-bar with some iron instrument, such as a screw-driver, knife, etc.; a little honey will keep the tool from sticking to the wax. Some use white milliner's glue for fastening it, or a cement made of equal parts of wax and rosin. After placing the foundation in position, top-bar downward, the cement being melted over a lamp, with a tin teaspoon bent to a small spout, he pours the cement upon the upper corner of the foundation, which, running down at the junction where foundation meets the top-bar, sticks it so fast that it would be hard to pull it apart again. Another plan for using comb-starters in boxes is to place the honey-box upside-down, then cut the piece of comb about an eighth of an inch longer than the depth of the box, and running one edge of the comb through the lower part of the blaze of a lighted candle until partly melted. Then put this melted edge on the place where you want it to stay on the bottom of the box (which, when righted, would be the top), and crowd the other edge into place. It is very quickly and easily done.

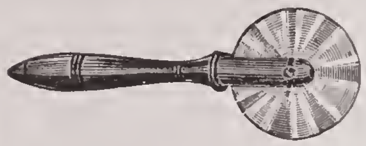


FIG. 25.—*Carlin's Foundation Cutter.*

HOW TO CUT IT TO DESIRED SIZES. Carlin's Foundation Cutter is the neatest, cheapest, and best thing we know of (Fig. 25). It is simply a revolving wheel of tin, fastened into a convenient handle.

For cutting it into strips of uniform size, for starters in sections and boxes, one has suggested a grooved board (Fig. 26), the distance between the grooves corresponding to the width of the strips desired to be cut. For starters in boxes or sections, it is quite desirable. A strip one-half an inch wide is sufficient, making an excellent guide.

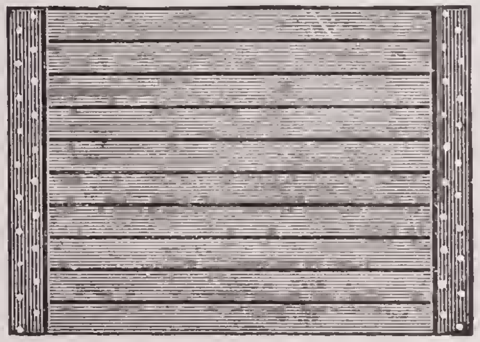


FIG. 26.—*Grooved Board for Cutting Starters Evenly.*

Comb foundation for the brood chamber should be pretty thick, so as to supply material for cells. Starters of foundation in surplus boxes are desirable, as they induce the bees to commence operations there much sooner than otherwise. If natural comb be used in surplus boxes, it must be new and nice. Any other is a damage to its sale as well as to its flavor.

The use of comb foundation bids fair to use all the available wax in the country. Every bit of wax and old combs should therefore be preserved. By the use of a wax extractor (Fig. 27) even the oldest combs can be melted up and reproduced in comb foundation, and be given again to the bees.

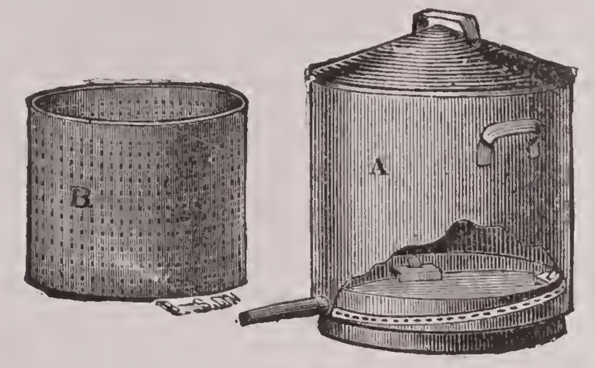


Fig. 27.—*Swiss Wax Extractor.*

Honey Bloom. Nearly all the flowering trees and plants of the vegetable kingdom yield honey and pollen. In earliest spring comes the bloom of myriads of fruit trees, with the maples, poplar, Judas tree, dandelions, willow, etc. In May we have the white sage, sumac, wistarias, barberry, etc. During June, the white clover abounds; also alsike and melilot clovers, honeysuckle, white sage, motherwort, borage, cotton, milkweeds, mustards, rape, St. John's wort, mignonette, okra, mints, tulips, elders, teasel, raspberries, etc. July gives us the basswood, figwort, sour-wood bloom, boneset, button-bush, catnip, etc.; while August and September present us with buckwheat, sunflowers, and myriads of golden rods, and fall flowers generally. Honey-dew is also a source of considerable honey in some sections of the country. Every apiarist should acquaint himself with the honey-plants of his locality, and with the time of their coming into bloom. By so doing he may make calculations in advance, and have the bees in condition to take advantage of the honey harvests as they occur. Bees never puncture fruit, and unless the skin has been broken by other insects or birds they never molest it.

Robber Bees. If all colonies are kept strong there is no danger of robbing. It is only the weak ones that are robbed. Working with bees at unseasonable times, leaving honey exposed in the apiary, etc., induces robbing. Black colonies and nuclei are usually the sufferers. Contracting the entrance so that but a single bee can pass, is usually a cure for robbing. In times of scarcity of honey, the apiarist should be careful not to keep a hive open long, or robbing may be the result. All strong colonies maintain sentinels at the entrance in times of scarcity. Those of that colony are allowed to pass, but strangers are "arrested on the spot." If a colony is unable to defend itself, close up the entrance with wire cloth and remove it to the cellar, or some other convenient place, for a few days, and when it is returned to the old stand, contract the entrance to allow only one bee to pass at a time.

Smoke is harmless and is the best thing to alarm and quiet bees. With a good smoker (Fig. 28), blow a little smoke in at the entrance before opening the hive; give them a little more as you uncover the frames; if very cross repeat the dose, until they yield obedience; then they may be handled with safety. Handle them gently and without fear, avoiding all quick motions; such usually incite them to anger. When honey is being stored rapidly, Italians may be handled without smoke; when there is a scarcity, it is not safe to do so.

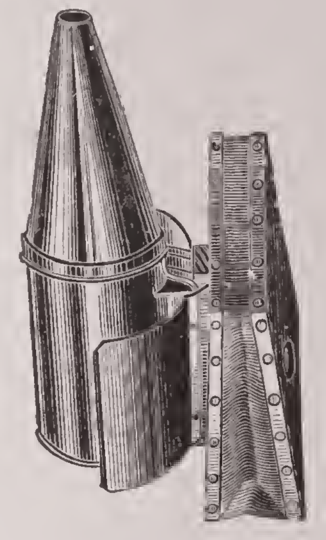


Fig. 28.—*Bingham Smoker.*

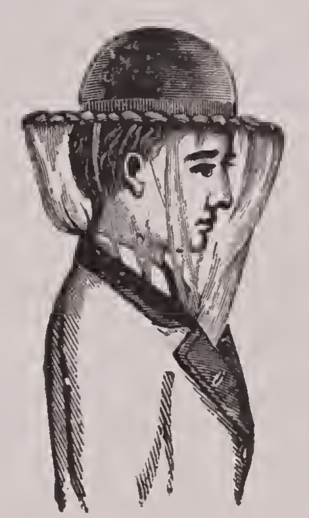


Fig. 29.—*Bee Veil.*

To those who are commencing, and until familiarity causes the loss of fear, a pair of good gauntlet gloves and a veil are necessary, but after that fear has been overcome, a good veil will be sufficient. Such may be placed over a hat, the bottom of it coming down under the coat or vest, and when thus adjusted it is a complete protection for the neck and face (Fig. 29). It being made of white netting, it does not stain the clothing, and as the piece over the face is black, it can be seen through nearly as well as if not worn. A good one costs 75 cents, and is a yard long; common black ones, so short as to be undesirable, can be obtained at a less price, but are much dearer in the end.

On being stung, if the poison-bag has not been emptied, remove it with a sharp knife, or, better still, with a pair of tweezers so formed as to grasp the sting itself, without pressing on the bag. Common hair tweezers are just the thing. This must, however, be done very quickly, or it will be of no use. Grasping the bag and sting with the fingers only squeezes the poison out of the bag and into the wound. After the bag has been removed, suck the wound strongly, and apply a poultice of moist mud.

Shipping Queens and Colonies. Before colonies are shipped the frames should be secured so that they cannot move. Old combs should be selected for shipping; and wire cloth nailed over the entrance serves for ventilation as well as to keep the bees in the hive. Of course a strip of wood should be nailed each side, from the cap to the bottom board, to keep the whole safely together.

To Introduce a Queen, it will be necessary to find the queen to be superseded and take her away. A black queen being easily frightened, will hide or run away to some corner; therefore it is best to proceed cautiously and without jarring.

In the middle of the day, when the old bees are at work, carefully open the hive, take out the center frame, examine both sides, and if the queen is not there, proceed with the adjacent frames till she is found. If not successful the first time, return the frames to their places, and close the hive an hour or two, till the bees become quiet, or until next day, and then repeat the operation. An Italian queen would be easily found, but the blacks are more troublesome. When found, either destroy her or make such other disposition of her as may be desired; cage the Italian queen and insert it between two combs containing honey which the queen may be able to reach at pleasure.

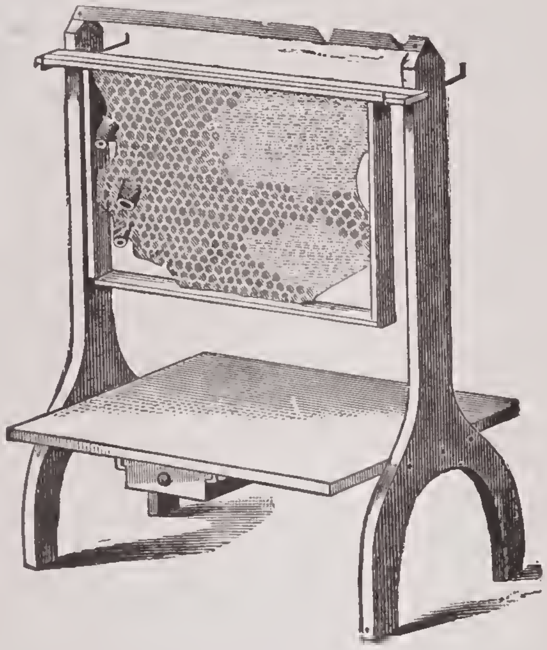


Fig. 30.—*Valentine's Frame Stand.*

Fig. 30 gives a good illustration of a piece of furniture that will be found very useful in an apiary. It is a stand on which to hang the first frames removed from a hive, when an examination of it is made. Usually the first frames are leaned against the hive, standing upon the ground, and more or less bees are injured. With this "stand," they are hung up, entirely out of danger.

The uprights are 1½x⅞, 24 inches high; a piece 1 inch square runs across the top for a handle to lift it by and to hold the top together. Two inches below the top bar are hooks on both sides, so as to hang on two frames if desirable. Four inches below the bottom of the frames (when suspended on the hooks) is a shelf 12 inches wide, to which the uprights are nailed. This make a nice place on which to lay cages, etc. Under this shelf is a drawer 6 x 8, that draws out on either side, in which to keep a dozen queen cages, a sharp-pointed knife, and a small pair of scissors.

In about 48 hours release the queen upon one of the combs, and see how she is received. If she is attacked by the bees, molesting her wings and legs, return her to the cage for another 36 hours, after which she will, no doubt, be accepted; or, dip her in a little honey, slightly warmed, if necessary, and dropping her among the bees, they immediately commence licking her off, and forget that she is a usurper. Queen cells, if any have been started, should be destroyed.

Another plan, and one that is regularly practiced in some apiaries with uniform success, is to make the colony queenless for 24 hours, and then with an atomizer (Fig. 31) throw a fine spray of peppermint water over both the queen and bees, letting the queen loose upon one of the central combs, and close up the hive. The peppermint water makes the bees and queen of the same scent, and almost invariably she is received with favor. The spray is so fine, that it is not the least detriment either to the bees, comb, brood or honey. With a valuable queen, where it is not desired to take the least risk, a new colony may be formed by taking hatching brood from several hives. Being all young bees, the queen will be unmolested. This may be done with perfect safety.

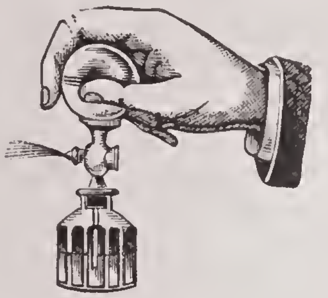


Fig. 31.—*Atomizer for Spraying Bees.*

Inserting a Queen Cell. A ripe queen cell will almost invariably be received with favor by a queenless colony. Of course all other queen cells must be destroyed. Fig. 2 shows a queen cell finished and ceiled, containing an embryo queen. The orifice *a* is capped, and the cell-walls are thickened preparatory to being extended in the direction of the dotted lines *b*, *b*. When the embryo queen is nearly mature, within 12 to 16 hours of emerging, the bees begin to demolish the exterior compartment (Fig. 3, *b*, *b*), reducing it to a level with the outer edge of the cap of the cell proper (Fig. 3, *a*). The convex cap, being then very prominent, is liable to be injured; and, to protect it, the bees coat it with a fresh layer of wax, making it nearly as thick as the cell walls. Fig. 4 shows the cell as seen after the anterior compartment has been removed, exhibiting the convex cap *a*.

The young queen pierces a hole through the edge of the cover with her mandibles, and then makes a circular cut along its periphery. Being thus detached from the cell walls, the cap drops, opening a circular passage, through which the queen emerges. To cut a queen cell out, commence on each side of the base of the cell, not nearer than half an inch, and cut upward a wedge-shaped piece (see Fig. 4), being careful not to squeeze or even to handle the base of the cell. A similar wedge-shaped piece must be cut out of the frame of comb that it is desired to put the cell into. Then carefully place the cell into the hole thus made, fitting it securely in position; place the frame into the hive and close it up.

NUCLEUS COLONIES. Nuclei are made by taking two or more frames, as may be desired (at least one of which should contain brood), with adhering bees, and the frame already furnished as above described, with a queen cell, and shaking into the hive bees from one or more frames, so that there may be enough young bees to remain after the old bees have returned to their former hives, to keep the temperature sufficiently high to hatch out the brood as well as to care for the emerging queen. In making up nuclei colonies *be sure not to take away the queen* with any of the frames, else the cell will be destroyed, and all the labor lost.

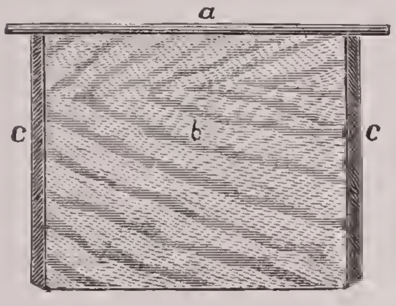


FIG. 32.—*Division Board.*

It is better to use the regular frames for nuclei hives, and either use the ordinary hives with a division board (Fig. 32) to contract the brood-chamber, and economize the heat, or make small hives just to suit the number of frames used for the nuclei. A board of one piece is neither patented nor patentable.

As the virgin queen emerges from the nucleus to meet the drones, sometimes the bees will accompany her if they have no unceiled brood. To prevent this, two or three days after the queens are hatched, insert a frame containing eggs and young larvæ in each nucleus. If the queen should be lost on her bridal tour, the materials will be on hand for the bees to get another, should the fact be unnoticed by the apiarist.

When the nucleus colonies are formed, set them away in the shade, and in two or three days the queen will be hatched, and a week or ten days later will become fertilized, and be laying; this may be readily discovered upon examination. Now the apiarist is ready for the formation of new colonies, without the inconvenience of natural swarming, by dividing the colonies. Bees swarm because it is their natural manner of increase. By dividing them we secure the increase without swarming, and save time in watching and hiving natural swarms. This, however, must not be overdone. The beginner sometimes imagines that by dividing he can make almost any number of colonies from each one, forgetting that strong colonies are the only ones that accomplish anything. Dividing should never be done unless the colony be very populous and can well spare the bees and comb, and this is generally after the clover season, and before the linden blossoms appear. To more than *double* the number of colonies each season is not good, unless increase is desired at the expense of honey. Some divide their strong colonies equally, or nearly so, carefully looking for the queen, putting her into the new hive, placing bees and brood in the center, filling up with frames containing comb foundation (Fig. 22), removing the hive with the queen to a new location, leaving the queenless hive on the old stand, to rear for itself a queen from the brood it contains. If the queen be a choice one, and it is desired to get queens from her, this is a good plan to get the queen cells started for the nuclei, before described.

Ordinarily the nucleus plan of multiplying colonies is the better. To perform this process, take one of the nucleus hives before described, which should be of the same pattern and size as those to be divided, and remove the division board. Then take a frame containing brood and adhering bees from each colony, placing them into the nucleus until it is full. Be sure not to take the queen away from any hive; supply the nucleus with a new queen. The bees that will hatch out in a few days will make that nucleus a populous colony. Put a frame nearly filled with comb foundation into each hive from which the frame of brood was taken, and in a few days they will have this all worked out into beautiful comb, and in all probability filled with eggs.

The new colony having a young and fertile queen, and plenty of bees, will soon rival the old one in the vigor of its work. Each of the nuclei can be built up in this way, giving a new colony every few days—or, if the apiary be large, several every day—and thus effectually prevent swarming. Increase being secured in this way, none of the colonies are disturbed, and the bees everywhere "pursue the even tenor of their way." All being kept strong in numbers they are ready for the honey harvest, and will work in boxes very willingly.

Another plan practiced with success, is to take away the division board in the nucleus hive, fill the frames with comb foundation, and exchange places with a populous colony, caging the queen of the nucleus for about 36 hours, or until her acquaintance has been made by the strange bees that come pouring into it from the fields; for bees will always return to the exact spot occupied by their home.

Dividing should be done in the middle of the day, when the bees are busy in the fields and the yield of honey is abundant.

It can be practiced up to Aug. 10. We would not advise it done later than that date, because the colony would not have time to rear a sufficient quantity of bees to insure safe wintering. Old bees cannot stand the rigors of winter, and in fact their lease of life would run out before spring. Natural swarming cannot be depended upon for rapid increase. With liberal feeding, and supplying the new colonies with queens, five good, strong colonies could be made from one, between June 1 and Aug. 10. We do not advocate too rapid increase. If forage is not abundant feeding must be resorted to. Do not let the feeding go till too late in the season, trusting the bees to get their living. Commence to feed as soon as the colony is ready for business, and that will be the next day after they are put into the hive. If you would make this whole arrangement successful do all the feeding not later than Sept. 20. A little food might be given later to stimulate breeding. All the sirup given them should be sealed up before cold weather sets in or it would sour before spring, and dysentery might be the result.

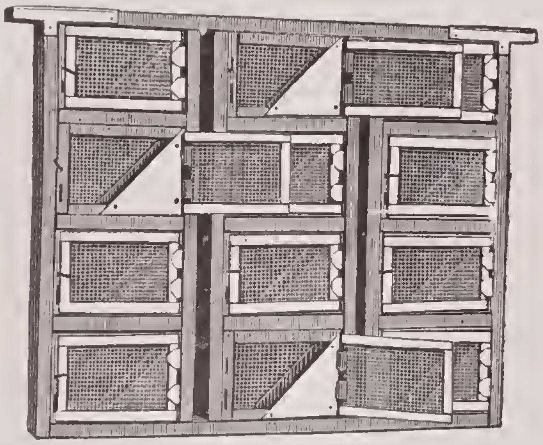


Fig. 33.—*Davis' Queen Nursery.*

To raise queens for the purpose of Italianizing an apiary, the Queen Nursery (Fig. 33), invented by Dr. Jewell Davis, may be used with success. Put into the cages of the nursery, between the tins, a few cells of ceiled honey, in new comb if possible. Then cut from the combs of a pure Italian colony as many queen cells, large and well developed, as you have prepared cages with the honey, as above. Suspend one of the cells in each of the cages. Good care should be taken to have the best cells, and not injured by bruising, handling or jarring. Each cage of the nursery should be supplied with a queen cell and food. The food is supplied that the young queens may not starve if the bees do not feed them, a thing they often fail to do when there is a scarcity of honey in the flowers. The nursery cages so prepared are adjusted in the nursery frame. Then having removed a center comb from a strong black colony, place the queen-nursery into the vacancy made by the removal of the comb, there to remain until the queens are hatched, which will be in three or four days, if the cells were not cut from the combs too early, or before the 9th day. When the queens have emerged from the cells, remove the cage and introduce the caged queen to a black colony, liberating her on the next day about sundown—if necessary, spraying the bees with perfumed water by the atomizer (Fig. 31).

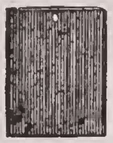


FIG. 34.—*Queen-Registering Slate.*

To remember dates every one has not the faculty, and yet all the operations of queen-rearing require that it should be done,—for instance, the time when a choice colony was made queenless, to have queen cells started—the time these cells are given to the nuclei—the time of hatching—when the queens commence to lay, etc. To save time and trouble in remembering these and other dates, a small slate (Fig. 34), 3x4 inches, with a hole in the center of the top, should be hung on the hive by a small nail with all these dates written thereon. A printed card tacked upon the inside of the cap is used by some to advantage, in keeping track of such dates.

If the dividing of colonies be neglected, or if it is not desired to practice that method of increase, the bees will become greatly crowded for room, and will necessarily swarm. For some days before swarms issue the bees may be seen clustering at the entrance of their hive, though some come out where there are little or no indications of a swarm. When honey is abundant, and bees plenty, look for them to come forth at almost any time, from the hours of ten in the morning to three in the afternoon (first swarms), second and third from seven in the morning until four in the afternoon. By examining the hive it can be ascertained whether they are about to swarm or not. If queen cells are seen with eggs or larvæ nearly ready to be ceiled over, a swarm may be expected within one or two days after the first cell is ceiled over, or as soon after as the weather will permit. After whirling a few minutes in the air, the mass of the bees will cluster on the branch of some convenient tree or bush, generally one that is shaded from the sun's rays. They should be hived as soon as the cluster is formed, else they may leave for the woods; or, if another colony should swarm while the first was clustered, they would probably unite. Should the queen fail to join the bees, by reason of having one of her wings clipped, or for any other cause, the swarm will return to the hive as soon as they make that discovery. As the bees are gorged with honey, they may be handled without fear of stings. "After swarms" being unprofitable, all but one of the queen cells should be destroyed, or cut out, as before described, for nuclei; this will prevent any more swarms issuing. Within eight days the first queen will issue, and finding that she has no rival she will take possession, apparently having no idea of swarming. To ascertain that she has no rival she makes a peculiar sound, called "piping." If there is another queen in the cell nearly ready to emerge, it will answer by a "piping" sound. If this queen still in the cell is protected by the bees, so that the first queen cannot find and destroy it, she will also prepare to swarm in two or three days. After the departure of this swarm and the emerging of the second queen, and her "piping" is also answered by a third queen, a third swarm may also issue. If the desire to swarm is satisfied after the departure of the first swarm, the queen cells will be all destroyed by the first young queen that emerges.

Clipping the queen's wing is done to prevent her from leaving with a swarm. In attempting to fly she will fall to the ground in front of the hive, and the bees missing her will return to the hive. This must not be done until after the queen has met the drones, or she will remain unfertile for life. To perform the operation, open the hive and lift the frame carefully, and avoid jars; when the queen is seen, with a pair of sharp-pointed scissors lift one of the front wings and cut off about one-half of it. It is better that she be walking, or at least standing, so that a leg be not cut off with the wing. She should not be handled; if it becomes necessary to pick her up, be sure not to take her by the abdomen. She may be held by the wings without danger.

If the cluster be low, hiving is easily performed. The queen is usually in the lower part of the cluster, and by finding "her majesty," and placing her into a hive, which should be placed conveniently near for the purpose of hiving the swarm, and with a dipper, or any other convenient vessel, place the bees down in front of the hive on a sheet, or piece of paper. They will then crawl into the hive, and, finding the queen, be satisfied to remain. When the bees are in, place the hive where it is to remain; a shaded position will be the best. If comb foundation be placed in the frames, it will be of very great advantage to comb-building.

If they have clustered on a branch or twig, a basket or bag will be quite essential, into which to shake or brush the bees. If on a wall or fence, or on the trunk of a tree, brush them into the basket, and proceed to hive as before described.

A frame of brood and another of honey placed into the new hive will be of much advantage to the bees. The former will prevent the swarm from leaving the hive, and should the queen be lost, it will give them the means of raising another, and the latter will give them a good start. By filling the other frames with comb foundation (Fig. 22) they will soon be in good condition and perfectly at home in their new quarters.

Sometimes a swarm will make for the woods without clustering; but this is rarely the case.

The beating of tin pans, and all such old-fogy notions, is, of course, of no avail; throwing a stream of water from a fountain pump is often done to bring down an absconding swarm, and cause them to alight and cluster.

THE LOSS OF THE QUEEN. When the bees manifest a restless and uneasy disposition by running about the front of the hive and signaling each other, especially in the morning and evening, it is a sign that they have lost their queen, and they should be examined at once.

It is highly necessary that the bee-keeper should glance at every swarm in the morning for a few days after swarming, so that, if any such loss should occur at this time it may be remedied at once by the introduction of a cell, or a fertile queen. In early spring, every colony should be examined for her presence. In the box hive, a little smoke may be blown in, and the bees driven back; if any brood can be discovered, it is a sure indication that she is there, and fertile. In the movable comb hive, it is only necessary to raise out one of the combs in the center of the cluster, and the condition will be recognized at once. If a few imperfect bees are found on the bottom board or in front of the entrance in early morning, it shows that the colony has a fertile queen, and further examination is unnecessary.

The queen has two notes: one of defiance, called piping; the other is a note of fear, a plaintive, pitiful wail, mournful in the extreme, and lingering long in the memory when once heard. This mournful note is set up when removed from her hive, when seized by the other bees to destroy her life, or when her colony are starving. Whenever this note is heard turn not a deaf ear, but immediately respond to the call, for there is something wrong. Rigidly examine the hive and remove the cause of complaint.

Should a colony become queenless from any cause, three weeks may be gained by having an extra queen to give it at once. Upon examination, if no brood is found where the bees are clustering, the colony is queenless. At any time during the season, from March to October, this is a sure sign. Colonies that lose their queens during the winter have a forlorn appearance. The bees walk around the entrance listlessly and without eagerness; but few of them go in search of either honey or pollen.

No time should be lost in giving a queenless colony a comb of eggs or young larvæ, or both, from which to raise a queen. Sometimes such a colony will refuse to raise queen cells; it may be too weak; its queen may be too old to lay, or they may have a fertile worker. If it be too weak, it should be united with another colony. If its queen be old, she should be removed and the bees given a frame of brood from a prosperous colony. If it has a fertile worker the most effective way to get rid of it is to break up the colony, dividing it among strong colonies having fertile queens.

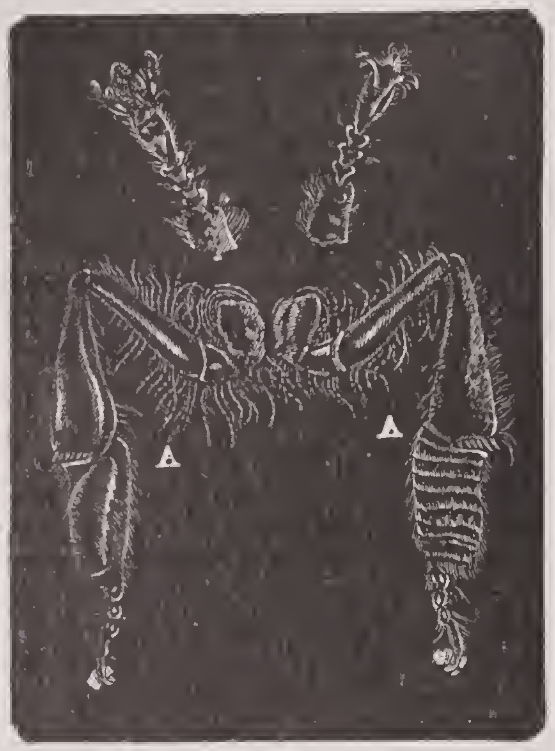


Fig. 35.—*Legs of an Italian Worker Bee.*

Transferring Bees. The best time to transfer bees from the common to movable-frame hives is about the season of swarming, though it may be done on any warm afternoon, when the bees are actively at work.

A transferring board (Fig. 38), about the size of the frame, should be prepared in advance, by making grooves of about one-half an inch wide and one-fourth of an inch deep, and about two inches apart. The spaces between these grooves should be cushioned with several thicknesses of cloth, to prevent the brood from being injured when the comb is laid upon it. Transferring sticks (Fig. 37) should be prepared from some light, tough wood, about one-half inch longer than the frames are deep, and about one-fourth of an inch square. Fasten two of these sticks together with a piece of fine annealed wire, so as to leave about one inch of space between them (Fig. 37); attach a piece of wire to the other end of one of the sticks (Fig. 37, *b*), which is to be used in fastening when placed around the frame of comb (Fig. 36). A small notch should be cut to admit the wire, and prevent slipping. These sticks should be made in pairs, and be kept ready for use.

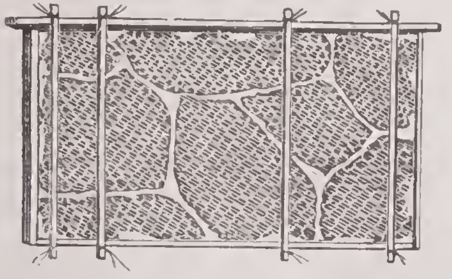


Fig. 36.—*Frame of Transferred Comb.*

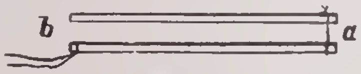


Fig. 37.—*Wired Sticks for Transferring.*

After smoking the bees at the entrance of a box-hive, remove it some distance from the old stand, leaving an empty hive or box in its place, to receive the bees that return from the fields; invert the hive, place an empty box or hive over it, of the same size and shape, wrapping a sheet or cloth around where they come together, leaving no cracks large enough for a bee to escape. By gently tapping the hive for some time, most of the bees, with the queen, will enter the upper box. When they have nearly all left the hive, place the upper box with the bees on the old stand. Being alarmed and filled with honey, they may be handled without fear. The old hive may now be removed to a convenient room or building, and taken to pieces, by cutting off the nails with a cold chisel and prying off the ends, cutting the combs when taken out as near as possible to the size of the frames to be used. The transferring board (Fig. 38) should be placed upon a table or box, to be in a convenient position for working over it. The pieces of combs containing honey may be placed at one side till some with brood are found; this should be put upon the transferring board (Fig. 38), so that when the frame is placed in position over it, the brood may be nearly in the same position as it occupied in the old hive and near the top of the frame, as that will be the warmest position in the hive. With a honey knife cut these combs to make them fit. If more are wanted to fill the frame, use the combs of honey first removed from the hive. Then push the ends of the sticks (Fig. 37, *b*) that have no wire attached, through the grooves, from the bottom of the frames, where the combs may need support; the other sticks attached, place on the top of the comb, and fasten the ends together at the top of the frame, as seen in Fig. 36, to match the fastenings below. Place this frame in the hive, and proceed in the same manner with the next brood comb, and let it occupy the adjoining position in the hive, giving the frames containing honey the outside position on either side. The honey from pieces of comb not used, and especially from all drone comb, should be removed with the Extractor. Carry the new hive to the old stand, and empty the bees out of the box on a sheet, in front of the hive. See that the queen, as well as all the bees, enter it. To prevent robbing, the entrance should be contracted; and in two or three days, when the bees have fastened the combs, the transferring sticks should be removed. Always work slowly with the bees, and avoid jarring. When it is desired simply to transfer from one style of frame to another, smoke the bees well, and after finding the queen and putting her in a tumbler or some secure place, take a frame, and shake or brush the bees off into the new hive; place the frame upon the transferring board (Fig. 38) and cut out the comb; place the new frame over it and cut to suit that frame, in the best way possible. Then fasten as before described with wire sticks (Fig. 37); after thus transferring all the combs, proceed to hive the bees as above directed, letting the queen loose upon one of the brood combs as soon as they are transferred.

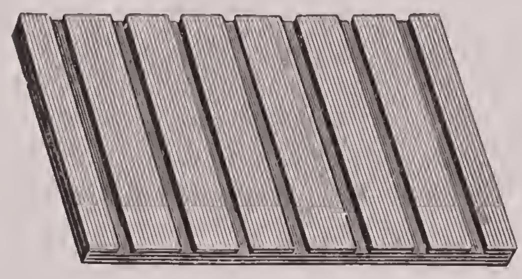


FIG. 38.—*Transferring Board.*

UNITING WEAK COLONIES. Weak colonies may be united after smoking them well, by removing the combs with adhering bees and placing them together in one hive, spraying them with peppermint water by an atomizer (Fig. 31), to give them all the same scent. Give them ventilation and close the entrance till sunset, placing them where the stronger of the two colonies stood. Swarms issuing the same day can be united peaceably.

FEEDING BEES. Extracted honey, or coffee A sugar, reduced to the consistency of honey, is best for feeding, in the absence of good ceiled honey. The poorer grades of sugar and glucose are totally unfit for feeding bees. To stimulate in the spring one-half of a pound per day is all-sufficient for a colony.

Shuck's Bee Feeder feeds at the front entrance, any time in the day, without danger from robbers, as the food can be reached only from the inside of the hive; it is placed on the alighting board, with the side (D) nearly covering the entrance. In the engraving, the top is cut away to show the wood divisions (A A) in the feed-cup; the food is poured into it without removing, through the hole (C), which is covered with wire-cloth. When done the cap (B) is closed over it, making all tight.

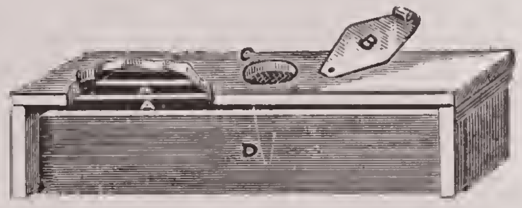


FIG. 39.—*Shuck's Bee Feeder.*

DIVISION-BOARD FEEDER. The top-bar of this (*b*) is two inches wide. In the cut the lower part of the face of the can is removed to show float, etc. From the upper central portion, beneath the top-bar, a rectangular piece the size of an oyster-can is replaced with an oyster-can (*g*), after the top of the latter has been removed. A vertical piece of wood (*d*) is fitted into the can so as to separate a space about one inch square, on one side from the balance of the chamber. This piece does not reach quite to the bottom of the can, there being a one-eighth inch space beneath. In the top-bar there is an opening (*e*) just above the smaller space below. In the large space is a wooden float (*f*) full of holes. On one side, opposite the larger chamber of the can, a half-inch piece of the top (*c*) is cut off, so that the bees can pass between the can and top-bar on to the float, where they can sip the feed. The feed is turned into the hole in the top-bar (*e*), and without touching a bee, passes down under the vertical strip (*d*) and raises the float (*f*). The can may be tacked to the board at the ends near the top. Two or three tacks through the can into the vertical piece (*d*) will hold the latter firmly in place; or the top-bar may press on the vertical piece so that it cannot move. Crowding a narrow piece of woolen cloth between the can and board, and nailing a similar strip around the beveled edge of the division-board makes all snug. The feeder is placed at the end of the brood-chamber and the top-bar covered by the quilt. To feed we have only to fold the quilt over, when with a tea-pot we pour the feed into the hole in the top-bar. If a honey board is used, there must be a hole in this just above the hole in the division-board feeder. In either case, no bees can escape, the heat is confined, and our division-board feeder is but little more expensive than a division-board alone.

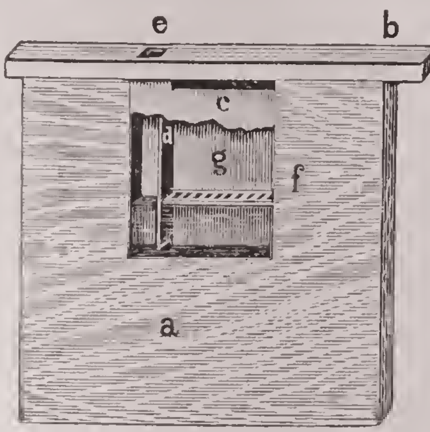


FIG. 40.—*Division-Board Feeder.*

The best time to feed is just at nightfall. In this case the feed will be carried away before the next day, and the danger to weak colonies from robbing is not so great.

In feeding during the cold days of April, all should be close above the bees to economize the heat. In all feeding, care is requisite that we may not spill the feed about the apiary, as this may, and very generally will, induce robbing.

Water is indispensable to bees when building comb or raising brood. Every prudent bee-keeper will see that his bees are supplied with water, by placing shallow wooden troughs filled with straws or floats, that they may drink without danger of drowning. A location near small bodies of water will be sufficient for a supply, but locations near large bodies are injurious.

DISEASES. *Dysentery* in the latter part of winter and early spring is a malady that affects some apiaries. The bees discharge their excrements over the hives and combs, producing a dark appearance and offensive odor. The cause is either fermented honey, improper food or no food, or too warm or cold, and poorly ventilated quarters. Give them good capped honey and a cleansing flight. If too cold for this out of doors, take the hive to a warm room, make a box, front and top of wire cloth or mosquito netting, adjust it to the entrance, so the bees must enter it on leaving the hive. This will usually prove an effectual remedy.

Foul brood is the rotting of brood in a hive; the caps of the ceiled brood appear indented and shriveled, and the larvæ and young bees in unceiled cells become putrid, emitting a disgusting stench. With an atomizer (Fig. 31) spray the hive, bees, brood, honey and combs with a solution of salicylic acid, borax and rain water, repeated on the sixth day. Remove the diseased brood from the hive and give them good capped honey, and if not too far advanced this may give relief.

Bees apparently dead from cold may sometimes be restored to life and activity by warmth and food.

Beer. The process of making the strong beers is too complicated for "home" manufacture.

To correct acidity in beer put in chalk, lime and alkalies; but it cannot be totally destroyed without spoiling the liquor.

Bittern is employed by fraudulent brewers to impart a false bitter, and strength, to their beers. Bittern balls are used as a fraudulent substitute for hops in making beer, and are different in composition to suit different kinds of malt liquor. There are several processes of "fining" ale by clarifying it. This is done when its quality has not been raised high enough in the brewing process.

To ripen beer add a small lump of white sugar to each bottle of ale or beer, and a teaspoonful of moist sugar to each bottle of porter, at the time of bottling and corking. A raisin or lump of candy is often added to each bottle with a like intention.

Mustiness in beer is remedied by adding to each hogshead one pound of new hops, boiled in a gallon of the liquor, along with seven pounds of newly burned charcoal, coarsely bruised, and a four-pound loaf of bread, cut into slices and toasted rather black; rouse well every day for one week, then stir in moist sugar, three or four pounds, and then bung down for two weeks.

COMMON BEER. Allow at the rate of two gallons of water to a handful of hops, a little fresh spruce, or sweet fern, and a quart of bran; boil it two or three hours; strain it through a sieve; stir in, while hot, a teacup of molasses to each gallon of liquor; let it stand till lukewarm; turn it into a clean barrel; add a pint of good yeast to the barrel; shake it well together, and it may be used next day.

GINGER BEER. To make ginger beer put into one gallon of boiling water one pound lump sugar, one ounce best unbleached Jamaica ginger well bruised, three-fourths ounce cream tartar, and two lemons sliced. Stir the fragments frequently in a covered vessel until lukewarm; then add one and a half to three ounces yeast, and keep it in a warm place so as to excite a brisk fermentation; the next day rack and strain through flannel; let it work for a day or two, then strain again and bottle, wiring down the corks.

Ginger beer, without yeast, can be made by boiling one and a half pounds bruised ginger in three gallons of water half an hour; then add 20 pounds white sugar, one pint lemon or lime juice, one pound honey, and 17 gallons water; strain through a cloth. When cold add the white of one egg, and half a fluid ounce essence of lemon. After letting stand three or four days, bottle.

ROOT BEER. Take sarsaparilla (American), two pounds; spice wood, half a pound; guiacum chips, one pound; birch bark, one-fourth pound; ginger, one-half ounce; sassafras, four ounces; prickly-ash bark, half ounce; hops, one ounce. Boil for twelve hours over a moderate fire, with sufficient water, so that the remainder shall measure five gallons, to which add tincture of ginger, eight ounces; oil of wintergreen, one ounce; alcohol, one quart. This prevents fermentation. To make beer, take of this decoction one quart; molasses, eight ounces; water, two and a half gallons; yeast, four ounces. This will soon ferment and produce a good, drinkable beverage. The root beer should be mixed, in warm weather, the evening before it is used, and can be kept for use either bottled or drawn by a common beer pump. Most people prefer a small addition of wild cherry bitters, or hot-drops, to this beer, and some prefer fewer or other ingredients.

OTTAWA ROOT BEER. Take one ounce each sassafras, allspice, yellow-dock and wintergreen; half ounce each wild cherry bark and coriander; half ounce hops and three quarts molasses. Pour boiling water on them; macerate for 24 hours; then filter and add a half pint of yeast; add about six gallons of water, or to taste. In twenty-four hours it is ready for use.

HOP BEER. For half a barrel of beer, boil half a pound of hops in a pailful and a half of water, with a teacupful of ginger. When brewed, put it warm into a clean cask, with half a gallon molasses; shake it well, and fill up the cask with water, leaving the bung open. Fill the cask when it works over. Before bottling, put a tablespoonful of molasses into each bottle.

SPRUCE BEER. Boil nine and a half gallons of water; let it cool down to 80 degrees Fahr., and then dissolve nine pounds of sugar in it, having previously mixed with it one ounce of essence of spruce. Then add one pint of good brewer's yeast, and pour it in a ten-gallon keg till fermentation is over; then add a handful of brick powder, and the white of two eggs beaten to a froth; mix with the beer, let it stand, and then bottle.

WHITE SPRUCE BEER. Dissolve ten pounds loaf sugar in ten gallons boiling water; add four ounces essence of spruce; when nearly cold add one half pint of yeast. Keep in a warm place. Next day strain through flannel, put into bottles, and wire the corks.

Another spruce beer is made of two ounces each hops and chips of sassafras root, ten gallons of water; boil twenty minutes; strain and turn on, while hot, one gallon good molasses, and add two tablespoonfuls each of essence of ginger and essence of spruce, one tablespoonful pounded allspice. Put into a cask, and when cold enough add one quart of yeast; let it stand twenty-four hours; draw it off or bottle it.

SPRING BEER. Boil down three small bunches each of sweet fern, sarsaparilla, wintergreen, sassafras, prince pine, spicewood, in eight gallons of water to six gallons decoction, or extract; strain; four gallons of water with one half gallon hops, boiled down to three gallons of decoction; strain; mix the two extracts of decoction together; dissolve in them one-half gallon of molasses, and when cooled to 80°, one and a half pounds roasted bread soaked in fresh brewer's yeast; fill up a ten-gallon keg. When fermentation is over mix with it the white of one egg beaten to a froth; bung it, and bottle when clear.

The following substances are used in the adulteration of beer and ale: Cocculus Indicus, salt, opium, Indian hemp, strychnine, tobacco, darnel seed, logwood extract, alum, burnt sugar, licorice, quassia, aloes, coriander, caraway, pepper, soda, salts of lead and zinc, lime, sulphate of iron, sulphuric acid, etc.,—and we might say, filth generally. Some of the above ingredients can be distinguished by the color of the beer, and some by the taste; but most of the subtle poisons can be detected only by a professional chemical analysis.

Beeswax. To prepare this article, take an old pan (such as you use to set milk in), and make quite a large hole in the bottom of it, large enough to put your finger through. Then have another pan smaller than the first; put some water in it and set it in the oven; then fill the large pan with honey-comb and put it on the small pan; have the oven hot, and the honey-comb will melt and the wax will run through the hole into the small pan; with a little pressing with a large spoon you will get all of the wax out. When the pan is full of wax, have a bucket of cold water ready, and turn the wax into the water; when you have enough wax out to make a cake, put it into a kettle and melt it again. Then all the dirt will settle to the bottom, and you can pour it off and leave the dirt in the kettle; the wax will be clean without straining. This may seem a long process, but it is the best known.

To bleach or whiten beeswax, take the cleanest beeswax you can obtain, melt it in hot water, skim it out in a basin previously oiled; when cold cut the wax in thin slices; expose these to the action of the sun and air upon white dishes, sprinkling it, unless there is rain, once or twice a day with clean water. At the end of a week melt the wax again, and proceed as before. In hot weather the wax may be floated on water in the middle of the day.

The presence of spermaceti in what is sold as "virgin wax" is shown by its reduced melting point, its bending before it breaks, and by its flavor when chewed.

To prepare wax for polishing floors, take 12 pounds yellow wax, rasp it and stir it into a hot solution of 6 pounds of good pearlash in rain water; keep the mixture well stirred while boiling; when the frothing ceases, cool off a little and stir in 6 pounds yellow ochre; pour it into tin cans or boxes and set it away for use. To put it upon the floor, melt a pound of it in 5 pints of boiling water, stir it thoroughly, and put it on with a paint-brush. After drying a few hours, polish with a large floor-brush, and wipe with a coarse woolen cloth. A coat of this wax ought to last six months.

Beet. The best soil is a deep, sandy loam, manured with well decomposed compost; the more mold the better; sod land is poor. Do not manure heavily with ashes or lime. Sow in drills 14 to 15 inches apart, and cover one inch deep. When the young plants appear, thin to four or five inches apart. For early use sow as soon as the ground can be worked in the spring; for autumn use, about the middle of May; and for winter use, about the middle of June; the long varieties a little earlier than the round, early kinds. When sown late increase the quantity of seed. When young the plants make excellent greens. To preserve during winter, cover with earth to keep them from wilting. The species called mangel-wurzels are raised principally for stock, and as they grow larger than other beets they require more room. They should be sown in drills about two feet apart, and thinned to 12 or 15 inches in the row.

Beet crops are valuable for stock feeding and for sugar. They are easily raised, and there is "money" in them. See Sugar.

VARIETIES. *Early Bassano.* One of the earliest, and an old standard.

Early Blood Turnip. Good for both summer and winter.

Long, Smooth, Dark Blood. Flesh dark red; skin smooth; excellent for winter use.

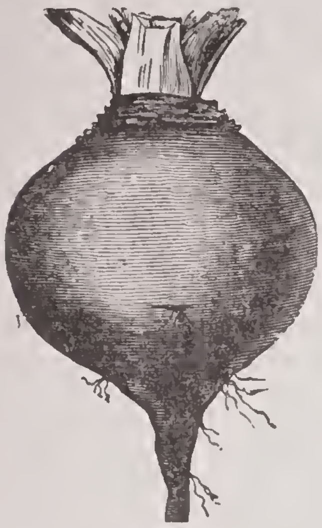


FIG. 1.—*Philadelphia Early Turnip Beet.*

Philadelphia Early Turnip Beet. Follows very closely after the Bassano; it is neither red nor white, but with alternate rings of lighter or darker pink; it boils red, and is, withal, rich, tender and sugary. It is a highly popular sort, identical with the Bastian and Simon beet of some catalogues.

Hatch's Early Turnip. Somewhat flat in form, but a favorite with some.

Yellow Turnip. Of a beautiful golden-yellow color; as early as Bassano.

Egyptian. Earlier than Bassano; tops remarkably small; excellent for market.

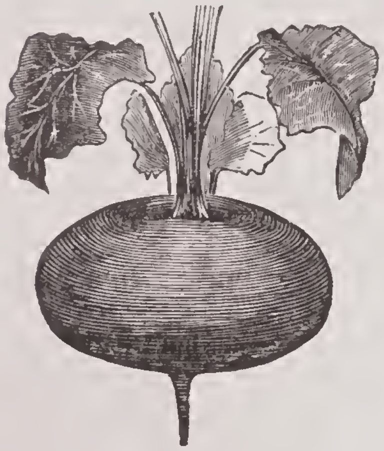


FIG. 2.—*Egyptian Extra Early Turnip Beet.*

Eclipse Turnip. Much like Bastian's Early; top small.

Dewing's Early Blood Turnip. Very symmetrical; free from fibrous roots; dark red.

Bastian's Half Long Blood. A new sort, of a fine dark color.

Henderson's Pine-Apple. Excellent for family use.

Dell's Ornamental Dwarf. Leaves of a peculiarly deep, rich red color, and ornamental; root grows partly above ground.

See also Mangel-wurzel.

Beets, TO COOK. Beets should not be cut or scraped before they are boiled, or the juice will run out, and make them insipid. In summer they will boil in an hour; in winter it takes three hours to boil them tender. The tops in summer are good boiled for greens. Boiled beets cut in slices, and put in cold spiced vinegar for several days, are very nice. One of the most satisfactory ways to cook beets is to bake them. When boiled, even if their jackets are left on, a great deal of the best part of the beet is dissolved, and so lost. It will, of course, take a little longer to bake than to boil them, but this is no objection. Allow from 15 to 20 minutes more for baking; slice them and treat as you would if they were boiled. One nice way to serve them is to chop them fine. After they are cooked, season with pepper, salt and butter.

Beetle, a maul; also, an insect, with wing covers. It constitutes one of the largest orders of insects: see Insects, and the various plants which they infest.

To destroy such bugs when they infest a cupboard, sprinkle on the shelf powdered borax, black hellebore, or gypsum. Cucumber parings are said to drive them away, and powdered camphor, spread on the cracks where they frequent, is said to bring them out, so that they may be easily caught and killed.

The annexed cut is the figure of a fine, large beetle, more common South, which is neither injurious nor friendly to the interests of man. He has no English name.

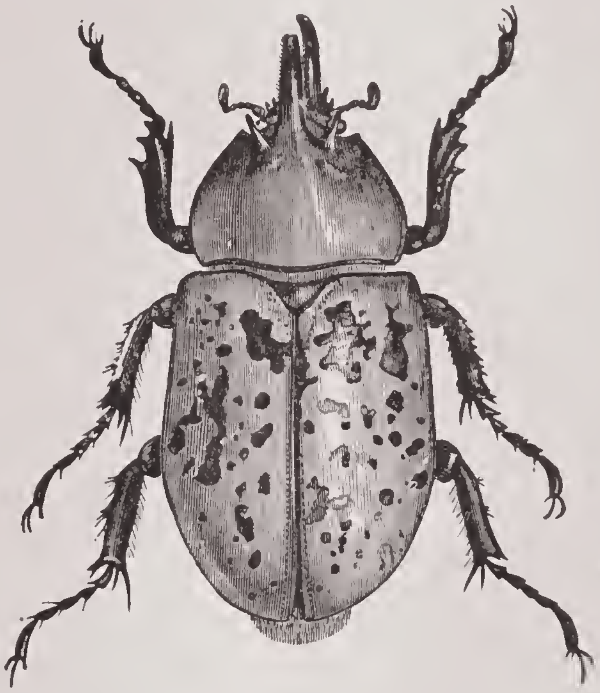


FIG. 1.—*Dynastes Tityus.*

Belladonna, a very subtle vegetable poison, extracted from the deadly nightshade, a plant native in Europe. It is a powerful narcotic, and with ointments is much used as an anodyne, or pain-killer. It is a popular drug among the homeopathists, but is too dangerous for unprofessional hands to deal with.

Bell Crank, a double crank, one arm of which is at an angle to the other. It is to change the direction of motion.

Bellwether, the sheep which has a bell on his neck and leads the flock.

Belt, a strip of timber; a disease among sheep; also, to shear, as the buttocks and tails of sheep. The other meanings of this word do not come within the scope of this work.

Bent Grass. By this name are known several of our most valuable grasses, as red-top, white bent, etc. These species have creeping stems, and are therefore difficult to exterminate.

Benzine (ben′zin), or **Benzole** (ben′zole), a highly explosive oil distilled from petroleum, and very useful in removing grease spots from fabrics. A bottle of it should not be opened within several feet of a flame, especially on the windward side. To remove the stain it leaves on certain cloth materials, apply moistened gypsum, and take it off when it is dry. A mixture of 10 parts benzine, 5 parts soap and 85 parts water has been very successfully used to destroy the parasites which infest dogs. It has also been used with good results in veterinary practice as an application in certain diseases of the skin, and thus diluted, is found to answer better than when used pure.

Benzoin (ben-zoin′), a kind of resin from a foreign tree, valuable in medicine and in perfumery.

Berberry: see Barberry.

Bergamot. The oil of bergamot, often called essence of bergamot, is distilled from the fruit of the bergamot tree, which is akin to the lemon. This oil is chiefly used as a perfume. "Wild bergamot" is a name given in this country to an herb similar to horsemint, and is called horsemint in the West.

Bevel, the narrow surface at the edge of a piece of wood or other material, at an angle to the general surface. Used also to denote the action; as, "to bevel."

Bevel Gear, the placing of cog-wheels obliquely to each other, to change the direction of motion.

Beverages: see Ale, Barley Water, Beef Tea, Beer, Broth, Champagne (Summer), Chocolate, Cider, Cocoa, Coffee, Cordials, Currant Sherbet, Egg Nogg, Ginger Pop, Gruel, Lemonade, Mead, (Metheglin, etc.), Milk, Porridge, Sago Milk, Sago Tea, Shells, Sirups, Soda Water, Tea, Toast Water and Wine.

Bezoar (be′zore), a chalky or stony mass sometimes found in the stomachs of cattle.

Bias. To cut cloth "bias" or biasing, is to cut it slanting across the stripes, warp or figure-work.

Biennial, every two years; also, living for only two seasons, as plants. Cabbage, turnips, parsnips, carrots, beets and many other herbs develop large roots or leaves the first season and go to seed the next, immediately after which they die, root and all. They are called biennials. Some plants, by changing climate or cultivation can change their character from annual to biennial, or from biennial to annual.

Biestings, the first milk of cows after calving.

Biffin, a baked apple crushed down into a flat, round cake.

Bigaroon, the large white-heart cherry.

Biggin, a child's cap or hood, or something worn about the head. Also, a contrivance for holding coffee grounds, through which boiling water is poured; a kind of strainer.

Biggon, or **Biggonet,** a cap or hood with pieces covering the ears.

Bight, the double part of a rope when folded, in distinction from the ends; that is, a round, bend or coil not including the ends. Also, the inward bent of a horse's chambrel, and the bent of the fore knees.

Bilberry: see Huckleberry.

Bile, the bitter, greenish fluid secreted in the gall-bladder by the liver.

Bilge, the larger portion of a barrel or a cask, which is generally in the middle.

Biliousness, a feverish state of the system which develops a yellowish skin and an appetite for sour or bitter drinks,—the condition supposed to be due to an overflow of the "bile" throughout the system, caused by a general clogging of the excretories, from malaria, bad diet, etc.

REMEDIES FOR BILIOUSNESS. *Regular:* A blue pill, followed by a mild purgative. *Homeopathic:* 1 drop of aconite 3 times a day; or 1 drop of mercurius vivus in 6 tablespoonfuls of water, one of which may be taken 3 times a day. Nux vomica, given like the last, is indicated by costiveness, loss of appetite, nausea, crampy headache, etc. *Botanic:* Soak some dandelion, both root and leaves, in soft water until the essence is extracted, boil down to a sirup and take 1 to 3 glasses of this a day. *Hygienic:* Diet principally on unseasoned fruits, graham crackers and vegetables; take a good sweating bath 2 or 3 times a week and receive friction or passive exercise. Take no active exercise.

Bill, or **Bill-hook,** a hatchet or hedging knife with a curved point.

Bill of Exchange, an order drawn by a creditor upon his debtor, demanding of him payment of a specified sum of money at a designated time. These bills are used for the settlement of accounts between parties separated by great distances. The acceptance of such a bill renders it a binding obligation upon the person on whom it is drawn.

Bill of Lading, a printed receipt given by the master of a vessel or the agent of a transportation company for freight shipped by such vessel or company.

Bill of Sale, list of goods sold, usually attested by a notary, justice or witnesses.

Bills Payable. Written obligations, as promissory notes, etc., are "bills payable" in the payer's accounts and "bills receivable" in the payee's accounts.

Birch, a forest tree, several species of which are found in the temperate zone all around the world.

The black birch is handsome, and valuable for timber. Red, or river, birch is found on the banks of rivers, and grows as high as the soft maples, with a diameter sometimes as much as two feet. The canoe or paper birch is common throughout the Northern States, in the wooded sections. It is characterized by a white or papery bark. Many ornamental varieties of birch can be had of nurserymen. The weeping variety is very graceful.

Birds. As to the comparative utility of most birds, statistics are yet too meager to settle the question. Song and feather enter so largely into the subject, that it will mostly be relegated to the domain of taste. Many persons are willing to sacrifice some of their fruits and garden and field products for the presence of song birds and birds of beauty. But from the low utilitarian standpoint, birds are classified as follows:

BIRDS TO BE PRESERVED AND FOSTERED: Blue birds, titmice (chickadees), warblers (small warbling birds found on trees and in gardens), kinglets (ruby-crowned and golden-crowned wrens), nut-hatches and creepers (black, white and brown); wrens, martins (swallows), vireos (greenlets), tanagers, finches, song sparrow, chipping sparrow, field sparrow, clay-colored sparrow, black-throated bunting, indigo bird, cardinal grosbeak, ground robin (chewink); blackbirds (crow, bobolinks, meadow lark and others); all the fly-catchers (including king-birds and the pewee); cuckoos, night-hawks (goat-suckers and whip-poor-wills); swifts (chimney-swallows); all the woodpeckers except the yellow-billed (or sap-sucker), and, perhaps, also the large red-headed woodpecker, plovers, prairie snipe (prairie plover), quail. It is also recommended to fruit-growers the raising of all species of domestic fowls except geese.

BIRDS DOUBTFUL, or whose habits are not sufficiently known to justify full recommendation, and whose habits are sometimes beneficial and sometimes injurious: Thrushes—including the common robin, cat-bird, mocking-bird, brown-thrasher, wood thrush, tawny thrush and hermit thrush; shrikes—including the great northern shrike and white rumpled shrike (butcher bird), Savanna bunting, crow, blue-jay, red-headed woodpecker, saw-whet owl, screech owl, horned lark, orchard oriole and pigeons.

BIRDS TO BE DESTROYED: Cedar bird, Baltimore oriole (hanging bird), larger owls, hawks, the English sparrow and the yellow-billed woodpecker (or sap-sucker). This species is distinguished from the other small woodpeckers by its pale yellowish breast, a large patch of black upon the upper part of the breast; the throat of the male is a bright red and that of the female is white; the adults, both male and female, have the top of the head also red. These points distinguish it from the downy woodpecker and the hairy woodpecker, which it closely resembles in size and form. These two species have the outer tail feathers *white* (or in the former barred with black and white), while the sap-sucker has the outer tail feathers *black*, while the center ones are nearly white. The hairy woodpecker has a *small* red spot on the *back* of the head only, which is easily distinguished from the red upon the head of the yellow-billed (or sap-sucker), which extends from the beak, covering almost the entire crown.

BIRD-CATCHING. A simple method, under favorable circumstances, is to burn sulphur under them when at roost in the low trees. Another plan is to steep some grain in wine lees and hemlock juice, and scatter it in some place where the birds frequent. On eating it they become intoxicated and drop over. The ordinary "quail trap," with which every country lad in America is acquainted, is still a source of uncloying entertainment. Catching birds by the use of "bird lime" has long been popular in the "old country." It is a viscous substance, usually made of the juice of holly bark or mistletoe berries, extracted by boiling, mixed with a third part of nut oil or thin grease. It may be obtained through a druggist. Put this substance into an earthen dish, adding one ounce of fresh lard to every quarter of a pound, and melt the whole gently over a fire. Take a number of wheat heads, with a foot of straw attached to each, and spread the warmed lime over the stalks for six inches below the heads; scatter a little chaff and throw the heads over a space of 20 yards; stick the limed straws into the ground with the heads inclining downward, or even touching the ground; then traverse the vicinity in order to disturb the birds and make them fly toward the snare. By picking at the heads they will become so entangled with the limed straws that they can be easily taken with the hand. This "lime" may also be applied to cords, rods or twigs, especially when it is intended to entangle the larger birds, such as snipes, plovers, thrushes, etc. For the latter purpose, take the main branch of any bushy tree, with long, straight and smooth twigs, such as willow or birch; clear the twigs of every notch and prickle; lime the branches to within two or three inches of the bottom, leaving the main bough from which the others rise untouched with the composition, and place the bush where the birds resort.

Hair nooses, baited with grain and certain seeds, are often successfully used with woodcocks, larks and other small birds when the ground is covered with snow. Stretch over the ground 100 to 200 yards of twine, pegging it down every 20 yards and fastening at every six inches a noose of double horse-hair. Scatter white oats along the line of the nooses, and await the result. When three or four birds are taken, remove them from the noose so the other birds will not be deterred.

One of the most successful modes of bird-catching is by the net, which is chiefly employed during the night. The method succeeds best on cold, dark nights. Take two light, straight poles 10 or 12 feet long; tie two corners of the net to the smaller ends, and fasten the other two corners as far as they can be stretched toward the thicker part, connecting the sides of the net along the poles with twine. Go to the thicket where the birds are, unfold the net and pitch it exactly the height of the bushes on the windward side, as the birds always roost with their breasts toward the wind. Let some one with a lantern stand behind the middle of the net while another beats the bushes on the opposite side, driving them toward the light; the birds will fly toward the illuminated net and fall into it.

In open countries a trammel net may be used, which is generally about 36 yards in length and six in breadth. The lower end is weighted to make it lie close while the upper is kept suspended at the two corners. The net is dragged along the ground at about a yard in height. At each end lights must be carried, and persons stationed with long poles to raise up the birds as they proceed, and to take them as they ascend under the nets. Along with the nets and lights a bell is frequently employed in open fields, from the middle of October to the end of March. At night, when the air is mild, take a low bell of a deep and hollow sound; provide a lantern or a square box, lined with tin, and open at one side, into which two or three large lights are placed; fix the box to the breast, carry the bell in the left hand and a hand-net in the right; this net may be two by three feet in size, or the bell may be tied to a girdle around the waist, and, as it hangs down to the region of the knees, the motion of walking will keep it sounding. A companion may walk on each side provided with a hand-net three or four feet square, but keeping a little behind, that he may not be within the reflection of the light. The sound of the bell makes the birds lie close, while the light also tends to overpower them as they are seen lying on the ground.

Some birds, as the goldfinches, wood-larks, titlarks, yellow-hammers, etc., may be taken in the day-time. They fly until noon, and against the wind. Take nets 12 yards long and 2½ wide, spread them on the ground parallel in such a manner as to meet when turned over; have lines attached to them so that by a sudden pull you can draw them over the birds which light between them. Use bird calls and decoy birds, and better still, birds in cages, one or two individuals of the kind you wish to catch. These will see their species before the catchers can, and call them to the place. Whole flocks are sometimes taken in this way.

Skylarks, in fine sunny weather, may be allured within the reach of clap nets by means of small bits of looking-glass fixed in a piece of wood in the middle of the nets, and put into a quick, whirling motion by a string. Quails and pheasants may be taken in the evening, by observing where they alight and drawing a net over them.

Cage Birds, Care of. Watch your birds to see if they have diarrhœa or costiveness; examine nests and wood-work for mites, and examine birds for lice; take each bird out and raise its feathers on head and body with darning-needle for lice. Crackers will make them costive. Recipes: Diarrhœa, give cayenne pepper; costiveness, half drop castor oil and change food; for mites, whitewash nests and wood-work with lime and a little carbolic acid to make it pinkish, or repaint cages; and for lice, anoint heads with olive oil, with a touch of carbolic acid in. Do not keep birds too warm, nor in a draught; give a pint of sand in a saucer to rub in and eat, and a saucer of water to wash in.

Canaries. The last of February or the first of March is early enough to mate birds. In cool weather the eggs hatch in 14 days, and in hot weather, 13 days. When the birds wish to hatch, tie to the side of the cage, near the top, and tight enough to prevent swinging, a nest, which may be a small, round paste-board box, or a little basket made for that purpose. Arrange cotton in the nest in the form of wild-bird nests, and line it with flannel. The nests can and should be changed as often as they require it. In raising any considerable number of birds it is next to impossible to keep them free from mites if you do not change the nests. Nests can be made of old collar-boxes, filled with hay or cotton, and covered with cloth. There are very few birds, however, but what will leave the nest if the cage is changed from place to place. They do not like to have strangers around. One person should have the care of them. Feed crackers and milk when they are raising their young. After hatching, take out the old nest, and put a new one in the same place. Feed at all times hard-boiled egg (cut the egg in two, and let them have it, shell and all). Allow them to bathe at all times. A sitting bird will not go back to the nest, after bathing, until her feathers are dry. Feed oats, bread and vegetables during winter. Hemp and canary seed will make them too fat, and should not be fed till time of mating. Mates should be changed as often as once in two years, or three years at the longest. The young birds will then hatch out strong and healthy, and will have much better constitutions. As soon as the birds begin to hatch supply them with hard-boiled eggs and cracker chopped together; also their usual supply of seed, water, cuttle-fish bone or sand. The position of the cage must not be changed until the birds are hatched, as the change of position sometimes causes the female to desert the nest. Continue the chopped egg and crackers until the young birds are at least a month old. After that they can take care of themselves, and will not need such food. They will not thrive without it during the first few weeks. They do wrong who remove the male bird as soon as hatching begins, as it generally happens that the male bird takes better care of the young ones than the female. Should the female begin to pick the feathers from the young birds (and that is often the case when they are two weeks old), remove her, and the male bird will continue to feed them until they can take care of themselves, and even longer. As soon as the young birds are old enough, remove them to another cage, and remove the mother bird to the hatching-cage, and she will hatch again. Canaries generally hatch six or eight times a year.

Four or five times a year is often enough for a bird to hatch young. Oftener than that is too great a tax on their vigor and vitality. The male birds will get poor in flesh if allowed to feed the young birds. Let the females attend to that. If they act dumpish and puny, with rough feathers, put a rusty nail in their drinking water. Besides the usual care nothing more than this is necessary in order to be successful in raising canaries.

To clean canaries of lice, place a clean white cloth over their cage at night. In the morning it will be covered with small red spots, so small as hardly to be seen except by the aid of a glass; these are the lice, a source of great annoyance to the birds.

To STUFF BIRDS, see Taxidermy.

Birth-mark, some peculiar mark or blemish at birth. Some such marks can be removed by the following process: Mix together one part pure carbonate of potash, four parts of rose water, two parts of Hoffman's Life Balsam and two parts of distilled water. Shake well and apply to the mark twice a day.

Biscuit, an unleavened cake made from flour, generally unsweetened and of a certain size, say two or three to the pint.

PLAIN BISCUIT. One pound of flour, half a pint of milk, two ounces and a half of fresh butter. Dissolve the butter in the milk, made warm but not hot, and stir it into the flour to make a firm paste; roll it out thin with a plain tin shape or a tumbler; prick each biscuit and bake.

LIGHT BISCUIT. Take 2 pounds of flour, 1 pint of buttermilk, half a teaspoonful of saleratus; put into the buttermilk a small piece of butter or lard, rubbed into the flour; make it about the consistency of bread before baking.

MOTHER'S RAISED BISCUIT. Scald one quart of milk; into this, while hot, put a piece of butter the size of an egg; when cold, add one egg, a teacupful of baker's yeast, or home-made; thicken with sifted flour to a batter as thick as muffin batter; let rise, mold, rise again, bake quickly.

TUCKAHOE BISCUIT. Three eggs, three cups sugar, one cup butter, one cup sour cream, one teaspoonful soda, essence of lemon to taste, sufficient flour to roll out soft and thin. Bake in tins.

TEA BISCUIT. One quart of sifted flour, a little salt, three teaspoonfuls Royal baking powder, a small handful of sugar; mix lightly through the flour; rub a large teaspoonful of lard through the dry mixture; mix with sweet milk or water, the colder the better; roll out soft to thickness of about one-third of an inch; cut with a large-sized cutter, and bake in a really hot oven.

COFFEE CAKES. Take some rice that has been boiled soft, twice as much flour as rice, a little fine Indian meal, and a little yeast; mix it with cold water, and let it rise over night; this will make a very fine biscuit for breakfast.

BREAD BISCUIT. Three pounds of flour, half a pint of Indian meal sifted, a little butter, two spoonfuls of lively yeast; set it before the fire to rise over night; mix it with warm water.

GRAHAM BISCUITS. Three parts of Graham, one part flour; use good shortening, and work into the flour well; to every pint of sour milk use one large spoonful of sugar; make them just as you would any biscuit; do not mix them hard, and bake in a quick oven.

BROWN BREAD BISCUITS. One pound of coarse Graham flour, two ounces of butter, and a little water. Make the butter and water boiling hot, add it to the flour, keeping it very firm. Roll the biscuits out, not too thin, and bake them in a rather quick oven.

BROWN BREAD BISCUIT. Two quarts of Indian meal, 1½ pints of rye, 1 cup of flour, 2 spoonfuls of yeast, and 1 tablespoonful of molasses. It is well to add a little saleratus to yeast almost always, just as you put it into the article. Let it rise over night.

GINGER BISCUITS. Eight ounces of flour, four ounces of butter, four ounces of loaf sugar, yolks of three eggs and some ground ginger. Beat the butter to a cream before the fire, add the flour by degrees, then the sugar, pounded and sifted, and a flavoring to taste of ground ginger, and mix the whole with the yolks of three well-beaten eggs. When thoroughly mixed, drop the biscuit mixture on buttered paper, a sufficient distance from each other to allow the biscuits to spread, and bake them a light color in a rather slow oven.

LEMON BISCUITS. Dry well before the fire a pound and a half of flour; rub into it a quarter of a pound of butter as fine as possible; mix with it a pound and a half of loaf sugar, pounded, and the peel of three lemons, chopped very fine. Well beat two eggs, add to them the juice of two lemons, and stir thoroughly. Put the mixture into the flour, and mix all well together till you have a stiff paste; roll it out to the thickness of a penny piece, and divide it into biscuits with a paste cutter. Bake them on a tin. These biscuits should be kept in a tin box near the fire till wanted, as they are apt to give.

Bishop, to make an old or bad horse look temporarily young and well, by clandestine arts, in order to deceive a purchaser.

Bismuth. For poisoning by this mineral give a salt-and-warm-water emetic.

Bite of Mad Dog, or other mad animal. Bandage around the part bitten, to prevent the poison from spreading into the circulation; suck the poison out with the mouth as thoroughly as possible; this must be done by a friend of the patient, if such can be found who will undertake the task; if one's mouth is not wounded, sore or raw anywhere, no poison will affect it; next, cauterize the place, either with a hot iron or with a solid piece of nitrate of silver (lunar caustic); sometimes the patient must be chloroformed or etherized. Let him drink plenty of warm water; or, take immediately after the bite, warm vinegar or tepid water, wash the wound clean therewith, and dry it; then pour upon the wound a few drops of hydrochloric acid, because mineral acids destroy the poison of the saliva. Another method is to cut the wound; to do this well, cut out a piece of wood the shape of the wound and insert it, to support its walls, that the cutting may be done more perfectly. In the course of six weeks one can tell whether all danger is passed; for, if by that time the wound has healed over with a sense of itching or burning still persisting in the place, all hope is gone, and the patient must in the course of time have Hydrophobia, which see.

Bite of Rattlesnake, or other poisonous reptiles. Treatment, same as for the foregoing; or, take 30 grains iodide of potassium, 30 grains iodine, 1 ounce water; mix and apply to the wound by saturating lint or batting, the same to be kept moist with the antidote until the cure be effected, which will be in one hour or sooner. Or, dilute carbolic acid or ammonia, applied every few minutes. Some say, when treatment begins, cover up the patient in bed; others, that he ought to be kept moving, in order to keep him out of the stupor that generally sets in at such times. To aid the latter it is recommended to give brandy and water; or, take of brandy, 2 drams; spirits of sal volatile, 40 drops; tincture of valerian, ½ dram; sulphuric ether, 15 drops, and camphor water, 1 oz. The effects of bites of insects can generally be dissipated by rubbing the part, and sometimes putting on a strong solution of some alkaline substance, as ammonia. The juice of plantain leaves applied, or drinking a large draught of whisky are also popular prescriptions; see Stings.

Bite, in mechanical work, is the hold which the short end of a lever has upon the thing to be lifted.

Bitters, the bitter properties of bitter roots, barks or herbs preserved in whisky for medicinal purposes. Generally, the beverage is only an excuse for whisky-drinking,—in effect, if not by design. We give a few of the best recipes:

No. 1. Make a strong tea of thoroughwort; strain it; when cool, put to two quarts of it a pint of whisky, the peel of two or three fresh oranges, cut in small bits, and six bunches of fennel seed. Turn the tea and liquor on the peel and seed in a bottle, and cork it tight. The bitters will keep good a long time; they are excellent for bilious complaints, and can often be taken when thoroughwort tea will not suit the stomach. Put a wineglass of the bitters to a tumbler of water, adding a little sugar at the time of drinking them.

No. 2. Take of poplar bark three pounds, prickly ash, golden seal, cloves, ginger, each three-fourths of a pound; balmony, one-half pound; cayenne, six ounces; sugar, five pounds; mix and sift. Dose: a teaspoonful in boiling water. Good in debility, loss of appetite, dyspepsia, etc.

No. 3. Take four ounces of columbo root, two ounces wormwood, two ounces tansy, two ounces quassia, six ounces gentian, four ounces dried orange peel. Bruise and mix well together, and put in two quarts of good whisky. Shake well every day, and at the end of ten days strain. Take a tablespoonful before each meal and two tablespoonfuls after. This is valuable in indigestion and all bilious complaints.

No. 4. Take one quart of good whisky, half pound bruised gentian, two ounces dried orange peel. Mix all together, shaking the ingredients occasionally during the day, and after six days strain off the liquor. The dose is a wineglassful mixed with a little water.

Bitumen (bit-u′men), mineral pitch. The term includes petroleum, asphaltum, mineral tar and naphtha. Bituminous coal is the soft kind, which in combustion yields a luminous flame.

Blackberry. There are several species of this valuable plant native in this country. The best for dessert or for cooking are the low blackberry, a trailing shrub, and several varieties of the high blackberry, which we will name and describe further on.

CULTIVATION. The blackberry is universally propagated by suckers, or offsets, springing up from the main roots. It may also be grown from pieces of the roots. Blackberry roots are as persistent as those of witch grass. The plants should be set two or three feet apart in the row, and the rows seven to eight feet apart, with a twelve-foot road at every sixth row for wagoning through the field. Some prefer the closer limit, as the ground is thereby better shaded, keeping it moist and preventing the weeds and grass from starting. Also the plants interlock with their branches and thus support each other when laden with fruit, and sometimes hold the snow up in a body and thus protect the twigs from freezing in severe cold weather. The general advice is to plant in the fall, placing a forkful of manure to each plant for mulching and plant food.

As to the selection and treatment of the ground we should in general endeavor to imitate nature as closely as possible; therefore the soil should be a rich loam, well drained, thoroughly and constantly mulched. Leaf mold is the best, but it is rather too tedious to collect. Very low and level land is objectionable for two reasons, namely: it does not drain well, and fruit trees and plants are far more liable to winter-kill in such situations. Even the Snyder, the hardiest of the blackberries, has been killed by freezing on low ground. No ground, however, can be made to last longer than five or six years with ever so much attention, as some essential element not yet discovered becomes consumed from the soil. The winter of 1878-'9 killed all the varieties in the West excepting the Snyder, and even that was damaged in some places.

The cane should be cut back the first week or so of June to two or three feet, and the branches checked at 12 to 15 inches. This work can be done very rapidly with a sharp butcher-knife. Some horticulturists, in the treatment of the Snyder variety, pinch back the branches but once during the summer, and then depend on the winter pruning, when they cut back one-third to one-half.

The object of this clipping off is to cause the canes to throw out lateral or side branches down to the ground, like a low-trained pyramidal tree, and to make the canes stocky and self-supporting. These laterals will soon extend to from one to two feet all around, and must themselves be cut back late in the winter or early spring. Those nearest the ground may be left ten or twelve inches long, those near the top say about two or three inches, and the intervening ones four, five, or six inches.

The weakness of the blackberry is to overbear, and the very frequent drouths common in summer aid to ruin a crop.

While this attention is given to the young canes the grower should also be careful to keep the earth mellow by frequent culture and thorough hoeing to kill weeds. These grow on rich blackberry land in May and June with surprising rapidity. The cultivator will take care of those between the rows, but for those that come up in the rows and between the hills (unless so planted as to cultivate both ways) the hoe must be used. But the hoeing need not be deep. The work should not be neglected so long that the weeds can become large or well-rooted, and small weeds hacked or shaved off by a sharp hoe just below the surface of the soil become very much discouraged after two or three operations. The ground there needs no special stirring, as blackberry roots are great ramblers and do not depend for sustenance on the soil within two or three feet of the hills. The weeds should be killed because they pump up moisture, are in the way for picking, and are untidy, but the few that grow just about the hills cannot do extraordinary harm, even if left. But begin with them on their first appearance, and again on their second appearance, and the work is then easy and rapid.

Moisture is what the blackberry specially needs for its perfection. When the rains are insufficient the cultivator and the hoe will go far toward supplying the lack. Constant work only will keep the soil in light and moist condition. The cultivator running through the plantation two or three times a week will usually put the crop beyond serious danger. But when the time for ripening is preceded by a long drouth and the yield of berries promises to be heavy the question of thinning out then becomes a serious one.

The greatest enemy in the culture of this fruit is the orange rust, which alone has caused blackberry-raising to be given up entirely in some localities. The Snyder so far has been almost free from this disease, but it is feared that it also may yet succumb to it. No remedy is discovered except to burn the canes affected as fast as they appear. A mite also attacks the blackberry in some fields and does perceptible injury. The Kittatinny is sometimes so thoroughly sapped by insects in the fall as to take away their life entirely, and the next year they seem to have been winter-killed. Indeed, some think that this variety never winter-kills, but is sapped to death by insects in the fall.

Wild blackberries are cultivated to some extent, but on account of the difficulty of imitating their wild and native surroundings perfectly, they do not do as well as in the forest. Most blackberries do better when protected by trees and shrubs.

VARIETIES. The principal varieties of the blackberry which have been cultivated in this country are the following:

Ancient Briton, or *Britain*. Good in the Northwest; fruit medium size and very sweet; canes hardy, and the plant tolerably free from suckers.

Barnard. This berry is a good one in the Northwest, and the plant stands the winters well.

Brunton's Early Prolific. Hardy, ripens a week before Wilson's Early, of uniform medium size, but being a pistillate it has to be with the Kittatinny or Snyder for the sake of fertilization.

Early Wilson, or *Wilson's Early*. Hardy, productive; fruit large, oblong oval, black, firm, sweet. Not very subject to rust. A good market sort.

Kittatinny. In quality of fruit this is the best blackberry and out-sells any other variety; its season is very long, being about six weeks; it does well, even during seasons of comparative drouth. Fruit very large, roundish conical, rich glossy black, moderately firm, juicy, rich, sweet. Until lately it was planted more extensively than any other kind but the Lawton. The cane of the Kittatinny is heavily set with thorns.

Lawton, or *New Rochelle*. This variety is of very vigorous growth, hardy and productive, but thorny; fruit very large, oval, fleshy, and when fully ripe intensely black; when mature it is very juicy, rather soft and tender, with a sweet, excellent flavor; when gathered too early it is acid and insipid. It ripens about the first of August, and continues in use five or six weeks. In the older sections of the Union, in protected situations, and where it is best known, it is one of the most popular small fruits that has ever been cultivated. It has been known to produce over one thousand full-grown berries in one season on a single stalk, the average size of fruit being from three-fourths to one and a half inches in diameter; quality excellent, very juicy; seeds very small, and few in number. Five quarts of berries will make one gallon of juice, which, mixed with two gallons of water and nine pounds of refined sugar, will make three gallons of wine, equal in quality to the best grape wine.

Missouri Mammoth. This is the largest blackberry, quite black, firm, rich, juicy, sweet, without any core, ripens early, and continues a long time in bearing.

See's Early. This new variety, which is now being extensively introduced, is very hardy, prolific; berries uniform in size and good for shipping. It ripens about two weeks earlier than most other kinds.

Snyder. At present this variety takes the lead in the West in respect to hardiness. It does not winter-kill except in low grounds in the severest winters, and so far it has resisted the rust better than any other. It has a tendency to overbear, is second best in quality, and ripens late. The canes bear the most the fourth year and afterward. The Snyder requires good cultivation and careful thinning and pruning.

Taylor. This new candidate for public favor is said to be hardy and prolific, the fruit large and delicious.

Triumph of the West, or *Western Triumph*. Canes hardy and very thorny; fruit highly flavored, but ripens late.

Wallace. This prolific blackberry is a comparatively new variety now being tested in the West.

Blackberry Brandy. To half a gallon of blackberry juice put one pound and a half of lump sugar, half an ounce of cinnamon, half an ounce of grated nutmeg, quarter of an ounce of cloves, and one ounce of allspice. Boil it a few minutes, and when cool, add one pint of brandy. This is an invaluable remedy for diarrhœa.

Blackberry Cordial. To one quart of blackberry juice add one pound of white sugar, one tablespoonful each of cloves, allspice, cinnamon and nutmeg. Boil all together 15 minutes; add a wine glass of whisky, brandy or rum. Bottle while hot, cork tight and seal. This is an astringent. Dose: one wine-glassful for an adult; half that quantity for a child. May be taken three or four times a day, in severe cases.

Blackbird: see Birds.

Blackboard, COATING FOR. Take pulverized slate, or quartz, moisten it to the consistency of a thick fluid with silicate of soda, "water glass" of commerce, and apply with a brush. Or, make a paint of asphaltum or grahamite, dissolved in naphtha. Or, mix flour emery with shellac varnish, which has been dissolved with alcohol, and add enough lampblack to give the required color. It requires a day or two to dissolve the shellac.

Blacking, FOR BOOTS AND SHOES. For liquid blacking, take ivory black, one pound; molasses, three-fourths pound; sweet oil, two ounces; beer and vinegar, each one pint. Rub together the first three until the oil be perfectly killed, then add the beer and vinegar. Other recipes for liquid blacking are given, most of which contain oil of vitriol, which, while it gives a brighter gloss, is said to injure the leather. For paste blacking, take of molasses one pound; ivory black, one and one-fourth pounds; sweet oil, two ounces; rub together and add a little lemon juice or vinegar.

BLACKING, FOR HARNESS AND SHOES. Take three ounces spermaceti, melt it in an earthen vessel over a slow fire; add six drams India-rubber cut into thin slices; let it dissolve; then add eight ounces tallow, two ounces lard, and four ounces amber varnish; mix, and it will be fit for use.

Another: Take camphene, one pint, and put into it all the India-rubber it will dissolve; when dissolved add currier's oil, one pint; tallow, six pounds; lampblack, two ounces; mix thoroughly by heat. This is a nice thing for old harness or carriage tops, as well as for boots and shoes. Or you can dissolve the rubber in the oil by setting them in rather a hot place for a day or two.

Another: Beeswax, two pounds; resin, one-half pound; fish oil, three-fourths of a pint; neat's-foot oil three-fourths of a pint; spirits turpentine, two and a half pints; glycerine, one-half ounce; lampblack, one-fourth pound. Melt the wax and resin, then stir in the other ingredients, when it is ready for use. Apply with a brush, and polish with a wet brush.

Bladder, Inflammation of. "Until the doctor comes," take a warm sitting bath for half an hour, free the bowels with tepid or cool injections, and remain in a state of rest. The general fever may be reduced a little by wetting the body, under the cover of the bed-clothes, and gently wiping off. Take a portion at a time, and avoid any draft of cold air upon the body. Eat no highly seasoned food, and drink no herb teas. Any acrid matter has a tendency to irritate the bladder, especially when it is tender and inflamed.

Bladders, To Prepare. Soak them for 24 hours in water, to which a little chloride of lime or potash has been added; then remove the extraneous membranes, wash them well in clean water, and dry them.

Blain, a disease of cattle, known by various names: see Cattle.

Blanc Mange (blo-monj′), a fine white pudding made from starch, isinglass or sea moss, with milk, sugar, cinnamon or nutmeg, etc.

Arrow-Root Blanc Mange. A teacup of arrow-root to a pint of milk; boil the milk with 12 sweet and six bitter almonds, blanched and beaten; sweeten with loaf sugar, and strain it; break the arrow-root with a little of the milk as smooth as possible; pour the boiling milk upon it by degrees; stir the while; put it back into the pan, and boil a few minutes, still stirring; dip the shape in cold water before you put it in, and turn it out when cold.

Oswego Blanc Mange. Four tablespoonfuls, or three ounces, of Oswego prepared corn, or cornstarch, to one quart of milk. First, dissolve the corn in some of the milk; put into the remainder of the milk four ounces of sugar, a little salt, a piece of lemon rind, or stick of cinnamon, and heat to near boiling. Then add the mixed corn, and heat to near boiling. Then add the mixed corn, and boil four minutes, stirring briskly. Take out the rind or cinnamon, and pour into a mold or cup, and keep until cold. When turned out, pour around it any kind of preserved fruit or jelly; or a condiment of milk and sugar may be used.

Rice Blanc Mange. Swell four ounces of rice, drain, and boil it in good milk to a mash, with sugar, a bit of lemon peel and a stick of cinnamon. Extraordinary care will be required to keep it from burning. Mold as above, and garnish with currant jelly or any red preserved fruit, or serve with cream or plain custard. See also Puddings.

Blanch, to bleach or whiten.

Blaze, a white mark or star in the face of an animal.

Bleaching. Under this head are included general recipes for bleaching, or decolorizing fabrics and goods.

To Bleach Cotton Pure White. Boil for three hours in water containing one gill to the gallon of either caustic potash or caustic soda; wash well from the lye; then lay the yarn or fabric to steep for four or five hours in cold water containing one pint of bleaching liquor to the gallon (to make this, see next article); then lift out and steep for an hour in a sour of one wine-glassful of sulphuric acid to the gallon of water; lift, and wash well; then boil for two hours in caustic lye, half the strength of the first; wash from this, and steep again for four hours in the bleaching liquor; wash from this, and steep again for one hour in a clean sour, made in the same manner as the first; wash well from this, and dry. A little smalt blue is put into the last washing water to clear the white.

Feathers. By the following process the feathers of ostriches and other birds may be bleached, even if these are naturally of a black or gray color: Place the feathers for from three to four hours in a tepid dilute solution of bichromate of potassa, to which, cautiously, some nitric acid has been added. After this lapse of time the feathers will be found to have assumed a greenish hue, owing to the oxide of chromium precipitated on the substance. In order to remove this, the feathers are placed in a dilute solution of sulphurous acid in water, whereby the feathers become perfectly white and bleached. Care is to be taken that the solution of bichromate be not made too strong, and especially that not too much nitric acid be used, which would cause an irremovable yellow color.

Wool. The first kind of bleaching to which wool is subjected is to free it from grease. This operation is called scouring. In manufactories it is generally performed by an ammoniacal lye, formed of five measures of river water and one of stale urine; the wool is immersed for about 20 minutes in a bath of this mixture heated to about 130 degs. Fahr., then taken out, suffered to drain, and rinsed in running water. This manipulation softens the wool, and gives it the first degree of whiteness. It is then repeated a second time, and even a third; after which the wool is fit to be used. In some places scouring is performed with water, slightly impregnated with soap; and, indeed, for valuable articles, this process is preferable; but it is too expensive for articles of less value. Bisulphide of carbon and benzine have been employed for cleansing wool. The fat may be saved by distilling all the solvent, which may be used over and over again. Sulphurous acid gas unites very easily with water, and in this combination it may be employed for bleaching wool and silk.

Instead of using the fumes of sulphur, one may use the following mixture: Four pounds oxalic acid, four pounds table salt, 200 quarts of water. The goods are laid in this mixture for an hour. They are then generally well bleached, and then only require to be thoroughly rinsed and washed.

WOOLEN RAGS. These are most effectually bleached by the application of sulphurous acid. Of course, in many instances, the color of the rags, supposing the same to be dyed or printed goods, will be also destroyed. Chlorine cannot be used for this purpose, because it causes woolen and silk fabrics to become yellow, and impairs the strength of the fiber by entering into chemical combination with the wool, silk, and other similar substances of animal origin; as, for instance, sponge, animal gut, isinglass, etc., all of which, if requiring bleaching, are bleached by sulphurous acid.

BED BLANKETS. These can be bleached by burning sulphur or brimstone, as in the case of straw hats.

WHITE FLANNEL. This fabric can be bleached with brimstone. The goods should be washed and rinsed clean before the process is begun.

WAX. Ordinary beeswax is bleached by exposure to the influence of the sun and weather. The wax is sliced in thin flakes and laid on frames raised from the ground, and frequently turned over and sprinkled. It will require about four weeks. If, on breaking, it is yellow inside, it must be remelted and exposed. Wax cannot be bleached by chemicals. Chlorine will whiten, but also greatly injure it.

STRAW BONNETS. Get a deep box, air tight if possible; place on the bottom a stone; on the stone a flat piece of iron, red hot, or a pan of charcoal, on which scatter powdered brimstone; close the lid, and let the bonnet remain a night, suspended on a hook.

STRAW HATS. The process of bleaching straw hats is the same as that of bonnets. Here is a distinct recipe for bleaching them: If the hat is badly sun-burned, soak it in sour milk a few days. Wash the hat clean in lively soapsuds, with either a flesh or tooth brush, then rinse. Have a tight barrel or box ready. Drive a nail in one side to hang the hat on, putting a thread through the rim to form a loop to suspend it by. Have the cover ready. Take an old dish, put in some live coals, then throw on some stick sulphur or brimstone, previously pounded into small lumps. Five cents' worth would be enough.

LINEN. The lye called "bowking," or "bucking," is prepared by dissolving potash in soft water, to which some soap is added. This liquor is heated to about 100° and poured upon the linen. After the cloth is well down in the lye, it is drawn off, heated a little higher, and again poured upon the cloth. This operation is repeated at intervals, allowing the lye to remain longer at each successive time, and moderately increasing the heat for five or six hours. The cloth should then be left steeping for three or four hours, when it is taken out and well rinsed. But each filament, after the alkaline process, retains a certain impregnation of coloring matter so intimately united as to resist the further action of it. This is removed by the slow and gradual influence of the atmosphere and the rays of the sun, which together decompose it. This is done by spreading the linen upon the grass, securing it by pins; sprinkle water on it, so that it shall not become dry for some hours. After it has lain for about half a day, the watering may be less frequent, and at night it is left to the full action of the air and dews. On the succeeding days it is watered three or four times a day, if the weather be dry. When it has remained till the air seems to have done its work, it should be again returned to the coppers, and bucked again with a lye somewhat stronger than the last, rinsed, and again spread upon the grass. It is thus bucked and watered ten or fifteen times, according to the weather, making the bucking stronger and stronger till about the middle, and weaker and weaker till the finish of the process. The scouring can be done as in bleaching cotton.

SILK. This textile must first be deprived of the natural varnish with which the filaments are coated, and to which is ascribed much of its stiffness and elasticity. This varnish is of a resinous nature, and is soluble in alkaline lyes. Soap generally removes it; but, as the matter separated is very fetid, putrid fermentation will take place and injure the silk, if it be not well rinsed in water. Steam is employed in France for this purpose, and to give silk its complete, splendid whiteness, it is necessary also to expose it to the fumes of burning sulphur, to destroy a substance of a yellowish color with which the European silk is impregnated. The silk intended to be white requires to be more completely scoured than that which is to be dyed.

Bleaching Liquor. This is made by taking a quantity of bleaching powder (chloride of lime) and adding to it as much water as will make it into a thin cream; take a flat piece of wood and break all the small pieces by striking them against the sides of the vessel; then add two gallons of cold water for every pound of powder; stir well, put a cover upon the vessel, and allow the whole to settle. This will form a sort of stock vat for bleaching operations.

Bleaching Powder, lime chloride, or chloride of lime.

Bleeding from an artery being divided or torn, may be known by the blood issuing out of the wound in leaps or jerks, and being of a bright scarlet color. To arrest arterial bleeding, get a piece of wood (part of a mop handle will do), and tie a piece of tape to one end of it; then tie a piece of tape loosely over the arm, and pass the other end of the wood under it; twist the stick round and round until the tape compresses the arm sufficiently to arrest the bleeding, and then confine the other end by tying the string around the arm. A compress made by enfolding a penny piece in several folds of lint or linen should, however, be first placed under the tape and over the artery. If the bleeding is very obstinate, and it occurs in the arm, place a cork underneath the string, on the inside of the fleshy part, where the artery may be felt beating by any one; if in the leg, place a cork in the direction of a line drawn from the inner part of the knee toward the outer part of the groin. It is an excellent thing to accustom yourself to find out the position of these arteries, or, indeed, any that are superficial, and to explain to every person in your house where they are, and how to stop bleeding. If a stick cannot be got, take a handkerchief, make a cord bandage of it, and tie a knot in the middle; the knot acts as a compress, and should be placed over the artery, while the two ends are to be tied around the thumb. Observe always to place the ligature between the wound and the heart. Putting your finger into a bleeding wound, and making pressure until a surgeon arrives, will generally stop violent bleeding.

ORDINARY bleeding from a wound on man or beast, may be stopped by a mixture of wheat flour and salt, in equal parts, bound on with a cloth. If the bleeding be profuse, use a large quantity, say from one to three pints. It may be left on for hours, or even days, if necessary. Soot applied to a fresh cut or wound, will stop the blood and abate the pain at the same time. To check bleeding from the lungs, let the patient eat freely of raw table-salt. Loaf sugar and resin, equal parts, powdered; take a teaspoonful four or five times a day. It will be found of great use. A tea made of yarrow is very useful in this complaint. Choose a light diet, chiefly of milk and vegetables, and avoid all hot and stimulating drinks. For bleeding at the stomach, take one pound of yellow dock-root, dry it thoroughly and pound it fine; boil this in a quart of milk and strain it off. Use one gill three times a day. Or, take a teaspoonful of chamomile tea every ten minutes until the bleeding stops.

In regard to bleeding a horse or other animal in the treatment of disease, see under the name of the respective animals.

Bletting, the spotted appearance of over-ripe fruit from decay setting in.

Blight, death and decay of a plant, caused by various invisible influences or microscopic germs. See the respective trees, as Apple, Pear, etc. The term is also used for an eruption on the human skin, consisting of minute reddish pimples.

Blinkers, bridle blinds: see Bridle.

Blister, OF SPANISH FLIES. Melt together seven and one-half ounces each of yellow wax and suet, six ounces of lard and three ounces of resin; when mixed remove from the fire, and a little before it hardens sprinkle in and mix thoroughly one pound of very finely powdered "cantharides," or Spanish flies. A stronger blister of this kind is made by mixing, at a heat just below boiling point, four and a half ounces of Venice turpentine, three ounces each of Burgundy pitch and cantharides, one ounce of beeswax, one-half ounce of finely powdered verdigris, and two drams each of powdered mustard and black pepper: see Plaster. This blister may sometimes be dangerous in the hands of unprofessional practitioners, and even in the hands of shrewd doctors. In applying it the case should be closely watched, and as soon as the skin is reddened the plaster should be removed and a poultice of bread and milk, or something else as bland, be substituted.

Blood, TO PURIFY. Take falsegrape, dogsbane, burdock root, and yellow parilla root, each in coarse powder, one ounce; boil all together in three quarts of water slowly to two quarts; strain and add four pounds of white sugar; then boil again for a few moments, and skim off the scum that rises to the surface. Bottle and keep in a cool place. The dose is half a gill three times a day. Or, agrimony, borage, burdock (sea), chickweed, chervil, fennel, fir tree, fumitory, garden cresses, wild water cresses, ground pine, hops, maiden hair, sorrel or tansy, made into decoctions with hot water, and taken every morning. The "Hygienic" method, as taught by the responsible authors of our school-books, is to live an outdoor life, take a thorough sweat every two or three days, follow a clean vegetable, grain and fruit diet, and keep in good humor. The blood can never be any more impure than the rest of the body is.

Blood, SPITTING OF. In cases of spitting of blood, it is often difficult to determine whether it proceeds from the internal surface of the mouth, from the fauces, from the stomach, or from the lungs. When the blood is of a florid or frothy appearance, and brought up with more or less coughing, preceded by rigors, a short tickling cough, a saltish taste, anxiety, and tightness across the chest, its source is the lungs. The blood proceeding from the lungs is usually of a florid color, and mixed with a little frothy mucus only. It may be distinguished from bleeding from the stomach by its being raised by hacking or coughing, and by its florid and frothy appearance; that from the stomach is vomited in considerable quantities, and is of a dark color. What is strictly meant by "spitting of blood," is when the blood is discharged from a ruptured vessel in the lungs. In all cases consult a modern physician, and until he otherwise forbids, moderate the discharge of blood by avoiding whatever tends to irritate the body and increase the action of the heart. A low diet should be strictly observed, and external heat and bodily exercise avoided; the air of the room should be cool, and the drink (which should consist chiefly of barley-water, acidulated with lemon juice) taken cold, and the patient not suffered to exert his voice. The recurrence of spitting of blood should be prevented by invigorating the lungs and purifying the blood, and by the use of cooling and astringent medicines. Keep in the mouth a little alum or saltpeter. The patient should participate very freely of acidulous fruits, as roasted apples, oranges, lemons, etc. Alcoholic drinks should be strictly forbidden. A decoction of bark with lemon juice, or a few drops of elixir of vitriol, is of great service.

Blooded Stock, that which is of pure or distinct breed. "Blood," in this connection, means breed, and "purity of blood" denotes the absence of any mixture with other breeds. As examples we have, among horses, the "Thoroughbred" (racers), Clydesdale, Morgan, Percheron, etc.; among cattle, "Short-horn," Alderney, Galloway, Devon, etc.; among sheep, Cotswold, South Down, Oxford Down, Merino, etc.; among swine, Poland China, Suffolk, Chester White, etc., and among poultry, Cochin China, Leghorn, Houdan, Brahma, Black Spanish, etc.: see Breeding, and the respective animals.

Blood-Hound, a variety of dog, with long, smooth and pendulous ears, remarkable for the acuteness of his smell, and employed to recover game or prey which has escaped wounded from a hunter, by tracing by the blood it had spilt.

Blotch, on the skin, is a pustule, a pimple containing pus or "matter;" more particularly a large pustule, or a collection of them, discoloring the skin, etc. Some of them can be obliterated by wetting the part once or twice a day for four or five days, with a five-per-cent. solution of carbolic acid, or a solution of silver nitrate, one grain to a half ounce of water. Blotches often proceed from bad dietetics, foul air, or the miserable habit of constant dosing for other ailments. In such cases external applications are, of course, of but little use.

Blouse (blowz), a light, loose over-garment, worn especially by workingmen in France. In America the garment is sometimes worn by workmen, and a certain form occasionally worn by little boys is so termed.

Blown, a disease of cattle; hoven.

Blueberry: see Huckleberry.

Blue-bottle, a kind of a plant with blue, bottle-shaped flowers, growing in corn; also a species of fly, with a large, blue belly.

Blue Vitriol, sulphate of copper: a combination of sulphuric acid with copper. Water will dissolve out the acid and deposit the copper as a lining to the vessel containing the solution. Blue vitriol is useful in many of the arts of life.

Bluing. To make liquid bluing, for rinsing white clothes, mix Prussian blue, pulverized, one ounce; oxalic acid, one ounce, with one quart of soft water.

Board Measurement: see Lumber.

Board of Trade, an organized body of active business men, not on a stock or money basis, but for mutual protection, for system in business, and as a safeguard for the rights of all concerned. It is composed of men through whose hands the products of the surrounding country must pass on their route to their final destination, the consumers. Its numbers are either actively engaged in the kinds of business that come under the supervision of the board, or have been. Some belong who do not actively engage at the business of the board, for once a member a person hardly fails to keep up his identity. Boards of trade in different cities have somewhat different spheres of action in many details, but the nature of such a body in general is well described in the following account of that at Detroit, Mich.

It is organized under the State law, having a president, vice-president, board of directors, committee of appeals, committee of finance, secretary and treasurer, committee on inspection of flour and grain, committee on inspection of provisions, committee on membership, inspector of flour and grain, and inspector of provisions. The duties of these officers and committees need not be stated in detail. The board makes its own by-laws and regulations. They occupy rooms called "Board of Trade Rooms," "Chamber of Commerce," etc. The meeting of the board is generally at 12 o'clock, and lasts one hour. What is meant by being "on 'change," is being at the session of the board during this hour of business. This is the only hour in the day devoted to business, and during this brief hour all the buying and selling of the day is done. The transactions, even in grain, sometimes amount to hundreds of thousands of dollars, and it is easy enough. Every man comes in knowing just what he wants, either to buy or sell, and with that state of mind business is rapidly done. After the board closes the members spend the remainder of the day in paying for grain bought and giving receipts for what has been sold, and getting ready for the next session of the board. The expenses of the board are kept up by membership fees, usually from $25 to $100 per year for each member. This, with a large membership, enables them to erect buildings of their own, and soon to become wealthy. Any person wishing to become a member must have his name presented to the board by some member, and is then voted in or out, after having had his case duly examined by the board; and it is not every one that gains admission. No person is allowed on 'change, except he is a member, or upon invitation of a member, as there is a janitor at the door who refuses admission to all that do not come as stated.

The method of working is as follows: As soon as a new crop of wheat is harvested samples are obtained from all portions of the surrounding country as soon as possible, and these samples are given to the committee of inspection, who, after carefully examining the different qualities, fix upon a standard for the different grades. They take Diehl wheat from the different sections, and selecting the best mix them together, thereby equalizing the color, as the color differs with the soil sometimes, and forming a grade of "extra white" which will suit the whole State. In the same manner they take samples of all white wheat, the best, and mixing them together they form a grade for No. 1 white; in like manner all the other grades. After the committee have done their work it is then submitted to the approval or disapproval of the board, for it is the most particular part of all their business, and requires knowledge of a superior kind relating to grain. Now comes the trouble. Here the farmer finds protection by having two sides to a question—in having bulls and bears. The bulls, or the sellers, want the grade just as low and easy as possible, in order that the country buyer and farmer may get the highest price for their inferior wheat, while the bears, or buyers, want the grade as high as possible, so their customers, the millers, will get as good wheat as possible for the money. They usually come to some compromise that is satisfactory and just to all. Having settled the standard which shall be their basis for buying and selling from, samples are sent to all the interior buyers that they may know how to buy. These grades last from one crop of wheat until the next, and the old grade holds good until the new one is established.

The buyers get the grades and dispatches that state the prices of each grade on 'change, for instance, to-day. A farmer comes in with a load of wheat, the first of the season; he does not know what grade it is, but usually hopes it is "extra." The buyer takes and compares the standard of extra with it, and they tell immediately whether it will go extra. If not that, then it must go No. 1, as there is no intermediate grade. If not No. 1 then No. 2, for there is none between. If not No. 2, then rejected. Just so with amber. The buyer elevates his wheat into separate bins, each kind by itself. He ships out a car of No. 1, for instance. If he is a good buyer he feels sure it will go through all right; but if he is green at the business, and has bought recklessly, has put into his No. 1 bin some friend's wheat that was not quite up to the standard, he feels uneasy until he gets the inspector's report. The car goes to market, where it is inspected by the inspector of the board, a man chosen for that purpose. He examines every car and puts his ticket on it, giving the grade. He does not know who the car came from, or who it belongs to, and is calculated to give an impartial decision of its grade, based on the standard furnished him by the board; and he is under heavy bonds to discharge his duties honestly. It then goes to the elevator and is elevated into bins for that kind of wheat. The shipper sends his agent notice of the kind and number of the car; the agent goes to the elevator, finds the car inspected, elevated, and weighed, gets his receipt, goes to the board and sells it for all he can, pays the freight and other charges, deducts his own commission, sends the shipper statement and net proceeds. It can remain in the elevator for ten days without charge; after that it must pay storage. The receipt given the agent has the number of bushels and the grade of wheat. There is no specified number of bushels in a car sold on 'change, as they vary; but a car-load is 20,000 pounds, or about 333 bushels. The same wheat while in the elevator may change hands any number of times before being shipped out, as the wheat is held for storage.

We have now traced the wheat to the elevator and to the board of trade; let us now see what becomes of it, and how the board benefits that part of the transaction. Samples of the standards are sent to all the different boards of trade in this country, also in Europe, where our grain is exported. Now, for example, a dealer in Liverpool wants some grain; he examines the different samples before him and chooses No. 1 Michigan white. He telegraphs to his agent in New York for so many thousand bushels of that grade. In time that agent dispatches to his buyer in Detroit for the amount. This last-named agent goes on 'change and buys it of the agents to whom had been sent the wheat bought of the farmers, making a long series of operations, which pass through a large number of hands, over thousands of miles of land and water; and yet, through the medium of grades established by the board of trade, each transaction has been done intelligently, each party knowing just what they were buying and selling. Neither does it stop here; it is frequently sold more than once before it reaches port, while in transit, and all is done smoothly and easily.

It enables the farmer to know just how thoroughly to clean up his wheat in order get such a grade, and it connects the whole business from the time it is first taken to market until it is finally consumed. There is no use of enlarging on its usefulness or its necessity, as it is just as essential to have the board establish the standards of grain, in order to do business understandingly, as it is for Congress to establish the standard of our coin. The influence of the board does not stop here. You will find that all foreigners coming here for information in regard to our productions, our commerce, or for any information as to the developments of the country, go to the board of trade for such knowledge, for they there find practical business men who can give information from practical experience. In fact, that body is generally the headquarters for the enterprise and business of the producing portion of the country.

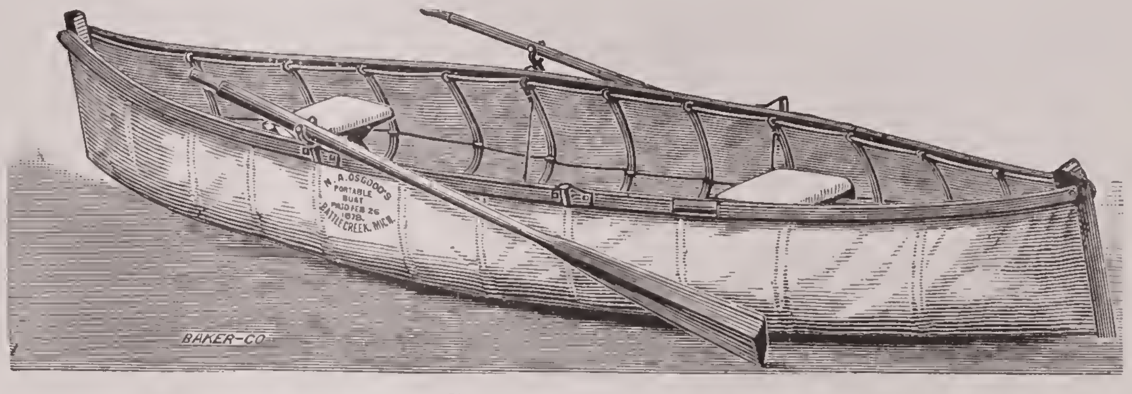


FIG. 1.—*Canvas Boat.*

Any person buying anything and refusing to receive it, is expelled from the board, and not permitted to do business there any longer. If a party is reported not sound, their affairs are immediately investigated and reported to the board. They have uniform rates to be charged for doing business, and any one charging either more or less is summarily dealt with. During the hour of 'change the board receives telegraphic information from all over the country, and the markets of Europe. Grain dealers accept the price paid for wheat "on 'change" as their guide to make prices from.

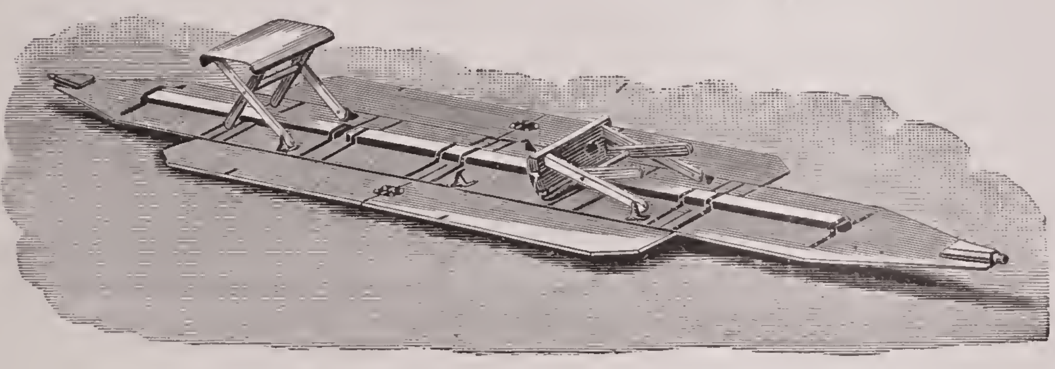


FIG. 2.—*Sectional Bottom Board of Canvas Boat.*

The influence of the board tends to remunerate business integrity, and gives preference to those old, honorable dealers that have spent the best part of their lives in building up business reputation. A man, to become influential, has to do so by years of patient industry in his business.

Boat. Many farmers, as well as sportsmen, combine profit and pleasure by hunting. One of the requisites of a successful hunter is a good boat, without which certain kinds of game cannot be successfully hunted. A boat will also be found a great convenience in many other ways, besides a source of much healthful recreation.

Fig. 1 represents a portable folding canvas boat, known as the "Osgood boat." This illustration represents the boat extended, ready for use. Its weight, with paddle, is only 20 pounds. The canvas is woven to order for the manufacture of this boat, and is stronger than the usual thickness of birch-bark or cedar canoes. The water-proofing leaves the canvas soft, preserves the fiber, prevents mildew, and renders it impervious to water. The ribs are red elm, the bottom-board and oars bass-wood, which is filled with patent wood-filling, preventing the water from penetrating the wood. The row-locks and square staples are of malleable iron. One can propel the boat rapidly, and with one-fourth the labor to row a wood or iron boat. It is very staunch; will not tip over by rocking or climbing into it from bathing; is sharp at both ends; can be made ready for the water in two minutes, and requires no tools or ingenuity to set it up.

Fig. 2 shows the sectional bottom-board as in the boat, with camp-stool, seats and oar-bar. The bottom-board is cut in lengths 34 inches each, and is held in place by sectional bars running through square staples—staples riveted to bottom-board.

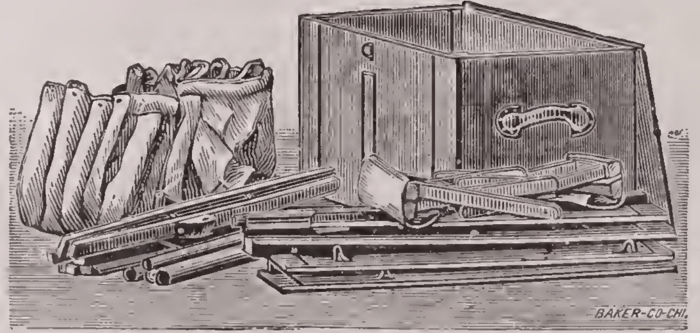

BAKER-CO-CHI.

FIG. 3.—*Boat Ready for Packing.*

Fig. 3 is a view of the boat in its compact form, showing boat folded; bottom-boards, camp-stools, oar-bar, stretcher and packing-chest. As practical instructions to the farmer who may wish to make a cheap and durable boat, we give plans of two of the leading kinds of small boats.

A cheap and durable flat-bottomed boat may be made in the following way: The bottom is of two white-pine boards, or other light, strong stuff, tongued and grooved together, and afterward cut to the shape shown in Fig. 7. The proportions given in the engraving may vary to suit circumstances. Cut the edge very accurately, giving to it a slight bevel upward that the joint with the side-boards may be close and water-tight. The stern is usually made of a tamarack "knee," though other wood will answer, in the shape shown in Fig. 5. The front of the upright part of the "knee" should be beveled to an edge, the bottom being dressed and fastened to the keel with screws or wrought nails. The stern should be six inches wider at the top than at the bottom; ¼-inch spruce stuff is best for the sides. To give the proper shape to the boat, two mold-boards are put in at the dotted lines shown in Fig. 7, to be removed when the sides are in place. Clamps should be used to hold the side-boards in position while being fitted to the stem and stern. Lap the second board nearly one inch over the first, and place a piece of cotton cloth dipped in tar between the boards to make the joints water tight. After the sides are in, remove the molds and put in two ribs, which should be of white oak, ½ by 1½ inch, made pliable by soaking in water, and secured in place by clinched nails. A strip of board, two inches wide, should be nailed around the outside of the boat near the top, or gunwale, and the seats, etc., put in, as shown in Fig. 8. The pair of oars may be of ash, but many will prefer paddles for a small boat of this kind. The cost of such a boat will depend very much upon the finish given it.

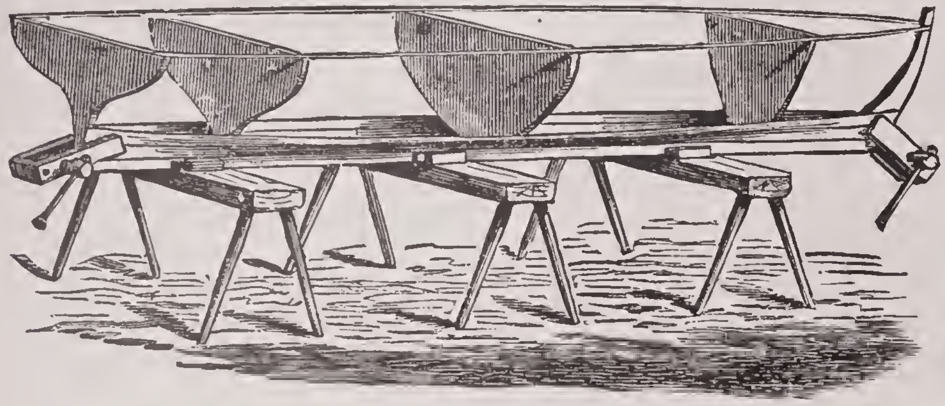


FIG. 4.—*The Trestles, Keel, Stem, Stern, etc., of Lap-Streak Boat.*

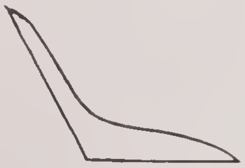


FIG. 5.—*A "Knee."*

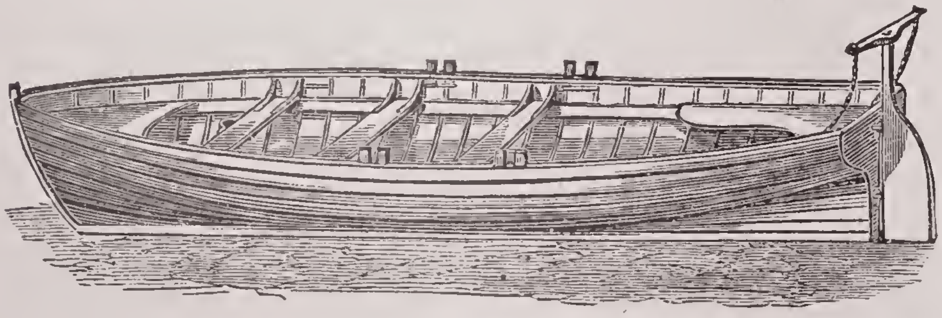


FIG. 6.—*The Lap-Streak Boat Completed.*

LAP-STREAK BOATS, suitable for rowing or sailing, may be made of any desired size; the proportions to be observed in building them are, to have the length four or five times the width, the greater width being adapted for mast and sail. The first item in the construction of this boat is the keel, which should be a piece of strong white oak, six inches wide and two inches thick, dressed to an inch at the bottom, and grooved at the top, to receive the first streak, or side-board. This keel should be fastened upon trestles, by means of wedges, to enable the work to be conveniently done. The stem of the boat may be of a "natural crook" of hard-wood, sawed to a proper curve, and mortised to the end of the keel. The stem, after being cut to a proper shape, is firmly fixed to the rear end of the keel of the boat by a "knee." The three mold-boards, to give shape to the boat, are next made, and fitted lightly to the keel, as they are to be removed when the sides are finished. The trestles and keel, with the stem, stern, and mold-boards, are shown in Fig. 4. The next work is laying on the streaks, or side-boards. These should be made of white pine, spruce, or cedar, smoothly dressed. They need to be cut of a particular shape, and this is determined by clamping the streak upon the molds, as shown in Fig. 4, marking the line to be cut, with a pencil. The first board is fitted to the keel and firmly nailed the whole length, no nails being driven into the mold-boards. The nails should be very pliable, so that they can be easily clinched on the inside with a light hammer, a heavy one being held on the head of the nail. As soon as the sides are finished, the ribs may be put in; they should be made of white oak, and secured in

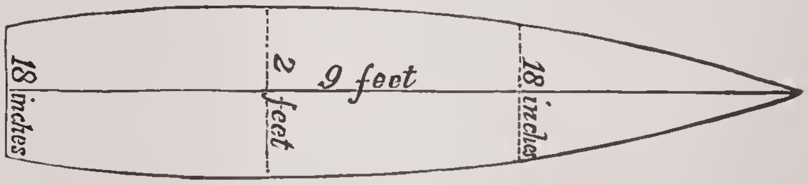


FIG. 7.—*Bottom of Flat-Bottomed Boat.*

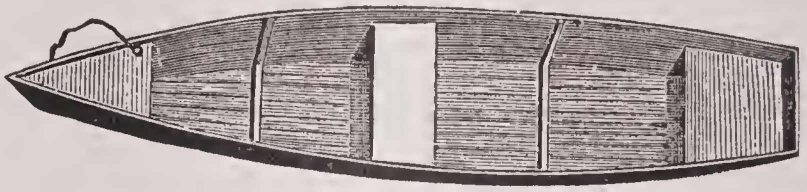


FIG. 8.—*The Flat-Bottomed Boat Completed.*

place by clinched nails. There should be some short ribs running up only part way from the bottom of the boat. A narrow board is nailed upon the inside to the ribs, a short distance below the rim, for holding the seats, etc. The gunwale is made by nailing a streak along the inside of the boat, it resting upon the ribs. The row-locks, rudder, etc., may be arranged as shown in Fig. 6. If it is desired to have the boat arranged for a sail, the mast can be "stepped" into a piece of plank placed in the forward part of the boat, with a strap of iron to embrace the mast, fastened to one edge of the forward seat. All the parts as they are put together should receive a good coat of paint, so that the boat may be water tight, and as durable as possible. When not in use keep it under cover.

Bobbin, a small wooden pin or bolt, with a head, on which thread is wound for making lace. A similar instrument bored through to receive an iron pivot, and with a border at one or both ends, is used in spinning, to wind thread on, as in sewing-machines, etc.

Bockey, a bowl or vessel made from a gourd.

Body, Human. The proportions of a perfect human body are these: The height is equal to the distance between the tips of the middle fingers when the arms are fully extended. Ten times the length of the hand, or seven and a half times the length of the foot, or five times the diameter of the chest from one armpit to the other, are also each equal to the height of the whole body. The distance from the junction of the thighs to the ground is the same as from that point to the crown of the head. The knee is just midway between the same point and the bottom of the heel. The distance from the elbow to the tip of the middle finger is the same as from the elbow to the middle line of the breast. From the top of the head to the level of the chin is the same as from the latter point to the level of the armpits, and from the heel to the toe. The length of the face, or distance from the hair over the center of the forehead to the tip of the chin, is one-tenth of the height of the individual.

Body Lice or **Vermin**: see Lice.

Boil, a hard, painful, inflamed tumor which on suppuration discharges pus ("matter") mixed with blood, and discloses a small fibrous mass of dead tissue, called the "core." Treatment: Poultice the boil and paint it with aqueous extract of opium, or tincture of iodine; renew the process every two or three hours. A piece of lint soaked in olive oil may be strapped over the boil if the person is necessitated to do business. Take alterative pills night and morning, and a decoction of sarsaparilla. If a boil breaks apply the black salve, or apply a little Venice turpentine; or an equal quantity of soap and brown sugar well mixed; or a plaster of honey and flour; or of figs; or a little saffron in a white bread poultice; or a tablespoonful of yeast in a glass of water, twice a day. Take an aperient.

Hygienic: Constant application of cold water; do not let the wet cloth become warm before renewing it with cold water. Preventive: Clean food, well prepared and well chewed, and out-door work. Physicians begin to believe that boils, carbuncles and other eruptions do *not* purify the system.

Boiler. To prevent lime from being deposited in a boiler, put in the cistern, from which the boiler is fed, a sufficient amount of oak tan-bark to color the water rather dark; run four weeks and renew. Sprouts from malted barley, two or three quarts to each boiler, have been used with success. In using these the engineer must not be deceived by the foaming of the water when he is heating up. See Engine.

Boll, the seed-pod of a plant.

Bologna (bo-lo′nia) **Sausage**, a large sausage made of bacon, veal and pork suet, chopped fine and enclosed in a skin.

Bolster, of a Wagon, the beam fixed under the fore end of the box to support it square with the hinder axle while the wagon is turning. It is connected with the fore axle by the "king bolt."

Bolt. To "bolt" food is to swallow it without sufficient chewing. Domestic animals often do this as well as human beings.

Bond, a written contract, whereby the principal maker agrees and obligates himself under certain penalties therein named, to do or not to do a certain thing, or that some other person shall do or not do a certain specified thing. There must be two parties, a maker and the person to be paid. It must be in writing, and generally under seal. No particular form of words is essential, but any words which distinctly declare the intention of the parties, and indicate that one is bound to the other will be sufficient. After it is signed and witnessed it must be delivered.

Bones, Broken, To Manage. When a bone in the arm or leg is broken, take several sheets of cotton batting, a piece of comfort or thin pillow, wrap it around the arm or leg, pulling on the foot or hand as the case may be. On the outside of the wrapping apply common laths or slats of wood and bandage firmly. In case of fractured rib, skull, spinal column and jaw, do nothing until the surgeon arrives.

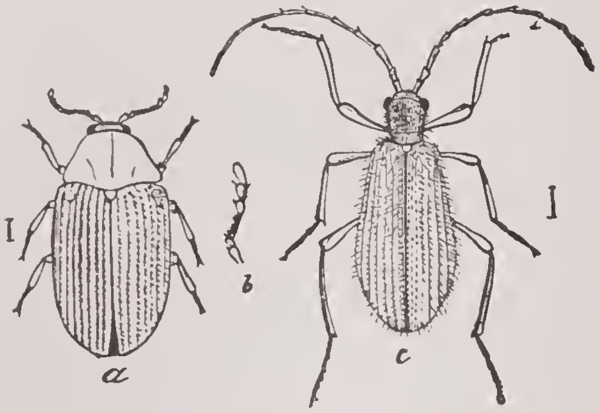
Bones, as Fertilizers: see Fertilizers.

Bone Spavin, a disease of horses: see Horse.

Bonny-clabber, or **Clabber**, sour milk that has thickened, or set like jelly. In Ireland the word is used for sour buttermilk.

Book: How to Distinguish a Good One. There are no reliable external "ear-marks" of a good book. Our best publishers and "best" authors often put forth poor books,—at least poor for some people. As a general rule those books are best which have originality or freshness in their style, either in the thought or language, or both; but it requires a student to discern even these characteristics. To ascertain the degree of thoroughness in a work requires a scholar. Books which show great care in their compilation and make-up are generally the most popular among the critics in their respective *roles*. Our general advice is, first fix clearly and precisely in your mind what you want, and then consult the men you consider the best judges in that line. At the present day book agents introduce nearly all the good books.

Book-case, Holders, Stands, etc. The book-case which every laboring man in the country wants is a closed one, which will keep the books away from dust and vermin; but the books and papers should be aired occasionally, to prevent a rank decay that poisons the atmosphere. A large one, set in the parlor, should have glass doors. Stands, for holding books when one is reading them, have been invented; but racks fastened to easy chairs are better. A rack for this purpose is easily devised, to be attached to the arms of the chair, and made adjustable to suit the convenience of the reader. Straps for carrying books to school are very common at the present day, and are a great economy. Insects often collect in the book-case, where their presence is a constant annoyance. One of these is a kind of small beetle which makes a clicking noise like the ticking of a watch, and hence called by the superstitious the "death-watch." It is indicated by *a* in the annexed cut. The other, marked *c*, burrows in leather-bound books. The natural length of each of these bugs is indicated by straight lines near them. Books should all be taken down occasionally and smartly slapped upon a table where the little creatures, thrown out, cannot get away until they are killed. There is no drug that will keep them out of the book-case but what is worse than the pest.



Beetles which Infest Book-cases.

Book-Keeping, the keeping of a systematic record of transactions and events, carried out in money value. While it cannot be said that an exact statement of the business of the farm is essential to success, yet the importance of keeping a true record of everything connected with the finances of the farm, will be denied by no intelligent farmer. Those who understand the value of farm accounts are surprised at the general neglect of them by farmers. The principal reason of this neglect is from the misapprehension of the difficulties of the work. To the uninitiated, book-keeping seems like a dark science, and only suited to commercial transactions. And in our agricultural journals, which earnestly and properly insist on the importance of exact farm accounts, the plans suggested are usually too complicated, and those who enter upon them get puzzled, and give it up. The books, also, which are prepared for farm records are usually exposed to the same objection. They overdo. Very few of those who have attempted the use of these books continue to make a satisfactory use of them. The farmer must have a very simple book. It is scarcely necessary to say that a large portion of farmers have not the clerical qualification for conducting any elaborate system of book-keeping. Happily such a system is not necessary. The farmer's book-keeping may be so simple as to be beneath the criticism of the professional clerk, and yet answer its purpose completely.

The first and most important question answered by a correct farm account is, What is the profitable income of the farm? This is answered by finding the difference between the whole income and the expenses, and the simplest way to find this is the best way. It is not practicable to open an account with each particular field or crop, or with every animal or kind of stock on the farm, as some fanciful theorists have advised. The expenses of working different fields and of feeding different kinds of stock so run into each other, that an attempt to keep a record in that way would end in confusion.

The farm expenses should be separated from the family expenses, and from all others. By not observing this rule, the widest discrepancies appear in the statement of the farmer's business. The farmer should know well what the expenses of his family are, but he should not let them be confounded with the expenses of the farm. It is this confusion of accounts which has led so many farmers to undervalue the profits of their business, and left them in inexcusable ignorance of the usual expenses of a family.

The "income" of the farm arises from what is sold, or what is used for the family. The record of income does not take notice of all that is produced on the farm. The hay and grain fed to the stock appear in the returns of the dairy, or in the beef and pork. Grain sowed or fed is not counted in the income. But the provisions raised on the farm and used for the family—grain, meat, milk, butter, eggs, chickens, vegetables and fruit—are as much a part of the income of the farm as anything sold from it. They may constitute a principal part of the income when the farmer's family is large, or his farm small. There can be no true statement of the value of the farm products if these are not counted, and the exact figures which exhibit this part of the farmer's income will surprise some of the most careful observers. Besides these, any addition to the value of the stock produced on the farm is a part of the income. Also any permanent improvements produced by the ordinary labor of farm hands and teams.

The "expenses" of the farm are labor, repairs, taxes, stock purchased, feed purchased, seed and fertilizers purchased, decrease in value of stock (if any), board of laborers and insurance. That is all.

Interest on the value of the farm and stock is not a part of the annual expense of the farm, but it will naturally enough be compared with the net income. Neither is the interest on any debt which may be due for the farm or stock. The salary of the manager, if he is the owner, is not a part of the expenses. His salary is in the net income.

Necessary repairs of buildings and implements is expense, but any entirely new building, in addition to what was, and any other improvements of the farm, is not expense, and if these improvements are made by the farm labor in part, so much of the cost of them must appear in the account. As it is a valuable addition to the farm, it is so much increase of capital, and so much of it therefore as appears in the account of labor may be put in the column of income, as will be shown by example.

INCOME AND EXPENSES OF THE FARM.

INCOME.		EXPENSES.	
Sheep sold	$176.29	Farm labor	$1,011.13
Wool	116.95	Repairs	224.38
Wheat	513.61	Extra labor	210.00
Corn	5.00	Seed purchased	73.48
Pork	185.40	Taxes	123.76
Beef and Cattle	329.43	Stock purchased	520.00
Milk	2,656.87	Board of men	240.00
Butter	252.00	Plaster, fertilizer	36.00
Veal	53.20		
Hay sold	68.70		$2,438.75
Wood sold	21.00		
Apples	35.00		
Potatoes	60.00		
Poultry	75.00		
Rent of tenant house	50.00		
Improvements	250.00		
Increase of stock	130.00	Net income	2,539.70
	$4,978.45		$4,978.45

This example is taken because it presents nearly all the variety of accounts. The income includes what was sold and what was used in the family. The corn raised was all fed to the stock except $5 worth used in the family. The hay and wood sold includes that to the tenant, which, with rent, is part of his wages. The permanent improvements were in conducting a spring of water to the barn, and the exact cost is put down, and not the value. The cost of it appears in the farm labor and extra labor, and as it is not an annual expense, but a valuable investment, it must appear in the income column. If it should appear only in the expense column, it would show money out of pocket. Farm labor and extra labor is increased by the permanent improvements in the other column. The repairs include farm tools, horse-shoeing, etc. No part of family expenses is here. The board of farm-hands is a farm expense, and as it adds so much to the cost of the household, it should appear, either being deducted from the sum of the family expenses, or added to the income of the household, as if the farmer paid his wife so much, say $240, for boarding his men, which would be a handsome way of putting it.

Insurance will probably not appear every year. Decrease in value of stock may not appear every year. It may increase in value, and will then appear in the column of income. To ascertain this, and for other reasons, an inventory of the stock is taken at the end of the year. The board of farm laborers is clearly one of the farm expenses, and should be properly noted and separated from the account of family expenses.

DAY-BOOK. This book is kept as a daily memorandum, out of which the ledger is posted. This may be a simple pocket diary, or a larger book kept at the house. In this all sales, contracts, etc., are noted under their proper date, similar to the following:

April 1, 1865. Have this day taken inventory of farm and what is on it, all of which are worth, at the market value, about $2,000.

May 3, 1865. Sold one yoke of oxen for $150, which cost $100 last fall.

July 4, 1865. Sold Milo C. Summers 2 horses, for $200. Received cash $100, and his note, due in 60 days, for $100.

Sept. 3, 1865. Paid S. J. Chapman $15 for 15 bushels of wheat for seed. Received for milk for August, $18.

Dec. 20, 1865. Paid for provisions, cloth and sundries, $56.

Dec. 31, 1865. Paid Michael (the hired man) in full for services for four months, $80.

These items should be posted under their proper headings in the ledger at least once a week.

The LEDGER should be ruled so that the "Dr." account will always be on the left, and the "Cr." account on the right hand side. The first ten pages of the ledger should be left for inventories, or accounts of stock, which should be taken once a year if possible, on the first of January. It must be a fair statement of the resources of the farmer, and include everything he owns—cash, land, tools, stock, notes and accounts due him, the amount spent for crops in the ground, all of which are entered under the head of "Resources;" also everything he owes, which are entered under the head of "Liabilities." Then foot up the columns of each, subtract the smaller from the greater, and he will know just how he stands. Compare this inventory with the one taken last year, and he will know whether he is making or losing. Example:

Inventory of the resources and liabilities of Harvey Williams, January 1, 1880.

RESOURCES.		LIABILITIES.	
Farm of 160 acres and improvements, @ $75 per a.	$12,000	Mortgage on farm........	$2,000
10 head horses, @ $100.....	1,000	Note to C. C. Chapman...	150
5 cows @ $35..............	175	Taxes due................	60
20 hens @ 50 c	10	Small accounts....	100
1 mowing machine	90	Total.................	$2,310
150 bushels corn @ 50 c....	75		
Note against S. Johnson...	500		
Outstanding accounts......	200		
Cash on hand.............	200	Net resources....	11,440
Total..................	$13,750		$13,750

The first account opened in the ledger should be "Cash." In it, the farmer keeping the account considers "Cash" as an individual and charges "To" him the amount on hand and all moneys received, and credits all moneys paid out "By" him. Thus all moneys received are entered on the "Dr." side and all moneys paid out, on the "Cr." side. The amount on hand at the opening of the account, together with the sums received at different times, should exactly equal the sums paid out and the cash on hand at the time of balancing the account. The Cash account should be balanced every month. The following illustrates the manner in which the cash account should be kept.

Dr. *CASH.* *Cr.*

1880.									
Jan.	1	To cash on hand	$200	00	Jan.	1	By 1 pr Pants	$ 5	00
"	6	" 4 cords Wood @ $2 - - -	8	00	"	1	" 10 lbs Sugar	1	00
"	13	" 10 lbs Butter @ 25c. - -	2	50	"	6	" 10 lbs Nails		60
"	16	" D. Love, on account - -	100	00	"	13	" Bill Crockery	20	00
"	23	" 1 pair Horses	200	00	Feb.	1	" Bal on hand	483	90
			$510	50				$510	50
Feb	1	" Bal on hand	$483	90					

After the cash account will come accounts with individuals. That of a farm hand would run something as follows:

Dr. *JOHN MORGAN.* *Cr.*

1880					1880.				
Jan.	1	To Suit Clothes	$ 20	00	Jan.	1	By Bal. from 1879	$ 50	00
"	6	" Pair of Boots	5	00	Apr.	1	" 3 Mos. work at $18.00 - - -	54	00
"	8	" Tobacco -	1	00					
Feb.	4	" Cash - -	2	00					
"	27	" 1 Knife -	1	00					
Mar	10	" Cash	1	00					
Apr.	1	" Note at 3 mos To balance -	74	00					
			$104	00				$104	00

The following may have been Mr. Williams' account with the store and shows the manner of balancing an account and opening a new one on the same page.

Dr. *JAMES CHAPMAN.* *Cr.*

1880.					1880.				
Jan.	1	To 10 lbs Butter, @ 10c - - -	$ 1	00	Jan.	1	By 100 lbs Sugar,	$ 10	00
Feb.	1	" 100 bu. Corn, @ 50c - - -	50	00	Feb.	4	" 20 yds Calico,	1	00
Oct.	4	" 50 bu. Wheat, @ 1.00 - -	50	00	Mar.	5	" Cash advanced on Corn - -	30	00
1881. Jan.	1	" Bal due him	1	10	May	3	" Cash advanced on Wheat -	40	00
					Oct.	1	" 10 lb nails @ 6c		60
					Nov	1	" 1 Curry-comb,		50
					Dec.	13	" Cash on acc't	20	00
			$ 102	10				$102	10
1881.					1881.				
Jan.	1	To 4 cords Wood @ $5.50 - -	$ 22	00	Jan.	1	By bal due him -	$ 1	10
					Jan.	3	" Cash to bal -	20	90
			$ 22	00				$ 22	00

All accounts should be balanced as in the above example at least once a year. The best time to do it is at the time the annual inventory is taken, January 1; the balances can then be inserted in the "Resources" or "Liabilities," according as they are on the "Dr." or "Cr." side.

We believe the foregoing comprise all that is necessary to show how to keep an accurate and complete account of farm affairs. Nothing can be more simple, and the farmer who fails to adopt some method and stick to it faithfully, will undoubtedly be a loser in many inscrutable ways, and will suspect that his neighbors or his own family have been cheating him when they are entirely innocent. In case a farmer cannot "journalize" and "post" books, he should *at least* keep a full memorandum of all his transactions, so that some one else can post them for him.

Farming on Shares requires a method of its own, in keeping the accounts between the proprietor and the tenant. The book should be kept by one or the other in his own name, and not as a partnership. The pecuniary relation of the two parties sometimes becomes perplexed, and difficult to settle, when the book is kept in the name of both parties. It is generally better that the book be kept by the tenant, who is always on the ground, and manages a greater number of sales and purchases. All his dealings with others, except the owner of the farm, are accounted in the same manner as the accounts of other farmers are kept. There are three methods or conditions of farming on shares: First, when the owner furnishes all the stock and tools, and pays the taxes, pays for the seed and commercial manures, and has two-thirds of the products of the farm. This is on the theory that one-third of the products is sufficient to pay for the labor on the farm, which is correct if the farm is a good one. Second, when the tenant owns the stock and tools, and pays for the seeds and manure and taxes, and has two-thirds of the products. Third, when half of the stock belongs to the owner, and half to the farmer, and the products equally divided. The theory in these three conditions is, that one-third of the products of the farm pays the interest on its value, one-third pays for the labor, and one-third pays the interest on the cost of the stock and tools, the depreciation in the value of the stock and tools, and the taxes, insurance and repairs. In all the conditions the grain used for seed or for feeding is taken out of the common stock, which is the same as each party furnishing his portion of the grain. If any feed is purchased, each party pays his proportion. The farmer generally has the rent of a house, and other things, according to agreement.

1876,	Ewing Summers, Proprietor.		Cr.
April 1.—	Cash for Oxen, &c. (by check)		$500.00
14.—	Cash by Brown for Hay, 3 tons, $42	(half)	21.00
	Calves sold to butcher, $26	do	13.00
28.—	Calf sold to butcher, $14	do	7.00
	Butter used in my family	do	3.50
	Butter to himself, 20 lbs., 25c.,	do	2.50
			$547.00
Dec. 8.—	Beef for my family, 280 lbs., at 8c., $22.40	(half)	$ 11.20
	Beef to himself, 130 lbs., $10.40	do	5.20
	Cash for Beef sold to Brown, 200 lbs., $16,	do	8.00
	Hide sold for $3.60	do	1.80
	Cash for Wheat sold, at the Mill, 160 bush., $280,	do	140.00
			$166.20

The account between the parties is most conveniently kept in a book by itself. The farmer (if he keeps the account) gives credit, or makes a charge for every item between them, on separate pages, as above.

The proprietor is charged $90, his half of the $180 paid for a yoke of oxen. So of the other stock. The whole cost should be stated, and the half indicated. April 30, the proprietor is charged $5 for 20 pounds of butter, and on the Cr. page he is credited with $2.50, which is his half. So also December 8th the beef delivered to the proprietor is charged to him, 130 pounds at 8c., $10.40. Then his half of its value is put to his credit, $5.20. So, also, the proprietor has credit for one-half of the beef which the farmer puts to his own use. By this method the account between the two parties is clear, and can be balanced at any time. At the end of April the balance due to the proprietor, who seems to furnish the capital, is $162, and at the end of December, $12.05, which is paid or allowed to stand, as agreed. It is decidedly best that the balance should be found *often*,—every month if the proprietor is at hand, at least two or four times a year. It requires but a few minutes of time, and often would save endless perplexity. This is in accordance with the teaching of long experience in the books to which we have been permitted to refer. If it is more convenient, the proprietor may keep the account, in his own name, and give to the farmer Dr. and Cr. in a similar manner, which is much better than to keep the account as of a partnership.

If all the transactions between the two parties are considered cash transactions, and each party receives his part of the income at the time in cash, or pays his part of the expenses at the time in cash, there would be no place for error. If the account is treated as such, the party who keeps the account is to pay over to the other his portion when he receives it, or otherwise he treats it as so much money borrowed, for which he gives the party credit.

1876.	Ewing Summers, Proprietor.			Dr.
April 1.—	Cash Paid T. Smith for Oxen, $180		(half)	$ 90.00
	Cash paid for 6 cows,	300	do	150.00
20.—	Cash paid for bran 2 tons,	50	do	25.00
25.—	Cash paid J. Jones by his order,			12.00
	Cash paid to himself			40.00
30.—	Cash paid Mills for Horse, $120 (half)			60.00
	Cash freight on Horse as agreed,			3.00
	Butter to himself, 20 lbs., at 25c.,			5.00
	Cash to balance,			162.00
				$547,00
Dec. 8.—	Beef to himself, 130 lbs., at 8c,			$ 10.40
20.—	Wheat put into his granary, 25 bush., $1.75,			43.75
	Cash			100.00
31.—	Cash to balance			12.05
				$166.20

Boots and Shoes. Almost everybody seems to know what a good shoe is, theoretically, yet, on account either of his own negligence or the mad persistence of the fashion-mongers in the manufacture of unhealthful articles, he has corns, or bunions, or blisters, or cold feet, or tender feet, or some other ailment—more, indeed, than he is willing to acknowledge. A good boot or shoe has low heels, wide toes, thick, stiff soles, soft uppers, and all of porous leather. The trouble is, most people will claim that their shoes are large enough, when they are not, as is evinced by their tender or sore feet. A perfectly formed foot is that which one would have if he went barefoot the year through in a climate that would admit of it. India-rubber, oilcloth and water-proof boots are all necessarily unhealthful, and should be worn only a short time in special emergencies.

WATER-PROOF COMPOSITION for boots and shoes: Beef tallow, 4 ounces; resin, 1 ounce; and beeswax, 1 ounce; melt together. When cold, add an equal quantity of neat's-foot oil. Rub into the boot well while it is being heated before a fire. Two such applications should be made. Or, dissolve a piece of paraffine in the best winter-strained lard oil—a piece the size of a hickory nut in a pint of the oil, aided with a gentle heat. Or, dissolve by heat an ounce of pure bottle India-rubber shavings in a quart of neat's-foot oil, and add two ounces of tallow. Specially recommended for sportsmen. For the soles, tar is best. See Blacking.

Borage, a rough weed, growing about two feet high. It is an excellent honey plant.

Borax, an alkaline substance of great utility. It is a necessity in welding steel. It removes stains and dirt from the hands better than soap, and at the same time softens and smooths the skin. It is splendid for washing the hair, and will, without injury, cleanse brushes and combs in a few moments. For washing purposes it saves both soap and labor. It will extract the dirt from articles of delicate texture without rubbing, it being only necessary to put the articles to soak with a solution of borax, over night, and need only to be rinsed in the morning. Two tablespoonfuls of pulverized borax dissolved in a quart of water, to which water enough is added to cover a pair of blankets, will cleanse them beautifully. It also saves great labor in washing paint. It drives away ants and roaches, if sprinkled on the shelves of safes and pantries.

Border, IN GARDENING, the edges of beds; also, a specially prepared and protected bed for assisting the early growth of plants that require some forcing to enable them to mature before the autumnal frosts, and also used for hardening plants before they are transplanted.

Bore: a horse is said to "bore" when he carries his head to the ground.

Borecole (bore′cole): see Kale.

Borer: see under Apple, Peach, etc.

Bot-Fly, an insect which lays its eggs on the hair of horses, especially on the under jaw and on the legs. These eggs are taken into the stomach and intestines of the animal, where they hatch, and as larves eat into the walls of the alimentary canal, causing the disease called "bots." See Horse.

Bots, small worms found in the intestines of horses. They are the larves of the bot-fly.

Bottles, TO CLEAN. Chop up a potato very fine, or break up some charcoal, put it in the bottle with some water, and shake it violently. Empty bottles, unless absolutely clean, should not be left with the corks in them, as in such case a very foul odor develops in them which is very difficult to get out.

Bouillon (bool′yong), soup.

Boulet (boo-let′), a horse whose fetlock or pastern-joint bends forward, out of its natural position.

Bound, costive or constricted; said of an animal when constipated in the bowels. When a horse is subject to other kinds of unnatural constriction he is said to be "hide-bound," "hoof-bound," etc.

Bovine (bō′vine), pertaining to the ox genus; belonging to cattle.

Bowels, INFLAMMATION OF. Apply wet cloths to the abdomen, of the temperature which is the most soothing, until the pain and inflammation is somewhat reduced; then give tepid injections. When diarrhœa accompanies, give a warm sitting bath and cool injections. Let the food be very bland, and let the patient rest. These things do, and if the case does not get along well, send for a doctor.

BOWEL COMPLAINT. This is a mixture of diarrhœa, dysentery and cholera morbus. The best medicine is a dose of castor oil and a few drops of laudanum. Oil is the best purgative for children in this disorder. Give it every other day with laudanum, until the disease is checked. The non-medicinal plan is: Free the bowels with copious injections of tepid water; cool hip baths every two or three hours; entire abstinence from food until the inflammation is somewhat subsided; then take bland food, such as toasted bread, gruel or mush, with sweet cream, etc.; rice, arrow-root and farina pudding, if made plain, are good.

Bows, OF A SADDLE, two pieces of wood laid archwise to fit the upper part of the horse's back, and to give a saddle its proper form and to keep it steady.

Box Elder, or **Ash-leaved Maple:** see Forestry, etc.

Boxes, CONTENTS OF. A box 24 inches by 16 inches, and 22 inches deep, contains 1 barrel; a box 16 inches by 16½ inches and 8 inches deep contains 1 bushel; a box 7 inches by 4 inches and 4½ inches deep contains ½ gallon; a box 8 inches by 8½ inches and 8 inches deep contains 1 peck; a box 4 inches square and 4½ inches deep contains 1 quart.

The general rule for finding the contents of any box is to multiply together the length, width and height, in inches, and divide the product by 2150.42, for bushels, or by 231, for gallons, "struck," or even measure.

Boy: see Children.

Brace, in rural affairs, when said in connection with fowls and (rarely) some other animals, denotes a pair; as, a brace of Houdans, etc. Also, a piece of timber or iron framed into a part of a building or any other structure, to support or strengthen it.

Bracket, a piece, or combination of pieces, of wood, stone or metal, triangular in general shape, and either plain or ornamental, usually projecting from or fastened to a wall or other surface, to support shelves, statuary or other objects, and to strengthen angles.

Brad, a nail with scarcely any head, to drive into nicely finished wood without breaking the surface around it.

Bragget: see Mead.

Brain, COMPRESSION OF, may be from any cause, such as apoplexy, or a piece of fractured bone pressing on it, and there is loss of sensation. If you tickle the feet of the injured person, he does not feel it. You cannot arouse him so as to get an answer. The pulse is slow and labored, the breathing deep, labored and snorting; the pupil enlarged. Raise the head, loosen strings or tight things, and send for a surgeon.

INFLAMMATION OF THE BRAIN begins with inflammatory fever, a flushed countenance, redness of the eyes, pain in the head, disturbed sleep, dryness of skin, constipation, restlessness, irritability, pain in the stomach, a tendency to delirium. It is caused by hard study, intemperance, grief, anxiety, stopping of evacuations, exposure to the heat of the sun, external injuries, etc.; respiration deep and slow, and sometimes difficult. The disease is a dangerous one, and often proves fatal in a few days, if not speedily arrested. Cure: Promote the evacuations. Remove constipation by purgatives, clysters, and mix nitre with tea and other beverages. Divert the blood from the head by restoring the circulation in the extremities: equalize the circulation. Bathe up to the knees in hot water. In excessive inflammation, apply cups to the temples, and the nape of the neck. Perspiration should also be promoted as much as possible. Should the disease appear obstinate, put a mustard plaster between the shoulders, and to the feet at night. Frequently apply vinegar cloths to the head and temples. The less irritation, noise, light, the better it will be for the patient. Cold water to the head, or tepid water if more comfortable, and tepid or hot water to the surface of the body, have a powerful effect in forcing the congested blood from the head, and restoring an equilibrium in the circulation. The food must be simple and light, as panada, water-gruel, toast and water or lemonade, light jellies, barley-water. Nothing stimulating must be taken. The unbeliever in drug medication will do all the above things except administering the drugs, with greater hope of success.

Braising. By this process more than mere "stewing" is of course intended. In braising, the meat is just covered with a strong liquor of vegetable and animal juices, in a closely covered vessel, from which as little evaporation as possible is permitted, and is exposed for a considerable time to a surrounding heat just short of boiling. By this treatment tough, fibrous flesh, whether of poultry or of cattle, or meat unduly fresh, such as can alone be procured during the summer season in towns, is made tender, and is furthermore impregnated with the odors and flavors of fresh vegetables and sweet herbs. Thus, also, meats which are dry or of little flavor, as veal, become saturated with juices, and combined with sapid substances which render the food succulent and delicious to the palate.

Brake, IN MACHINERY, is a lever or other contrivance used for retarding the motion of a wheel by friction against it; also, in agriculture, a large, heavy harrow for breaking clods after plowing.

Bramble, wild briars of the blackberry and raspberry kind.

Bran, the skin or husk of corn, particularly wheat, separated from the flour by the process of bolting. It operates by mechanical irritation, as a very gentle aperient, merely quickening the passage of the contents of the intestinal canal; and when given in the form of mash, and used with caution and moderation, it certainly is useful as an occasional aperient. But it ought in no instance, whether in the raw or in a scalded state, be used constantly as an article of diet; for, if so used, it is apt to weaken a horse's bowels, and to excite in them many disorders. A very large proportion of ammoniacal phosphate of magnesia exists in wheat bran, and this salt forms large crystalline concretions, often amounting to several pounds in weight, in the cœcum of horses belonging to millers. Bran is useful for dry food for sheep and in the stall-feeding of cattle, and an infusion of it is said to be a remedy for scurf and dandruff.

Branches, OF A BRIDLE, are two pieces of bent iron which bear the bit, the cross chains and the curb.

Branding, the stamping upon an animal of the initials of its owner's name, or other marks, to denote property. One method is to burn in the initials or marks with a hot iron, and this is properly branding. Another method is to stamp them on with an iron dipped in a boiling mixture of tar and pitch; this is termed "buisting."

Brandy, an ardent spirit distilled from wine. The name is also given to spirit distilled from other liquors, particularly, in this country, to that which is distilled from cider and peaches. In the north of Europe the term is also applied to a spirit obtained from grain. The art of distilling spirituous liquors is of course entirely without the scope of this work, but we will tell how to make some kinds of fruit brandy:

BLACKBERRY BRANDY. Grind to a coarse powder one-fourth ounce each of cinnamon, cloves, and mace, and one dram of cardamom; mix these with sixteen pounds of mashed blackberries and five gallons of ninety-five per cent. alcohol; let it stand two weeks, press it, and add ten pounds of sugar dissolved in three gallons and three pints of water. Filter.

CHERRY BRANDY. Mash sixteen pounds of black cherries, with their stones; add five gallons of ninety-five per cent. alcohol, and let stand two weeks; press; add ten pounds of sugar dissolved in three gallons and three pints of water. Filter.

Another: Cherries, thirty-six pounds, half red and half black; squeeze them with the hands, and add one and a half gallons of brandy; let them infuse twenty-four hours; then put the bruised cherries and liquor into a canvas bag, a little at a time, and press it as long as it will run; sweeten with fine sugar and let it stand a month; bottle off, putting loaf sugar into every bottle.

Another: To every gallon of brandy put four pounds of red and two pounds of black cherries, one quart of raspberries, with a few cloves, a stick of cinnamon and a little orange peel; closely stop for a month in a barrel; bottle off as before.

PEACH BRANDY. Mash eighteen pounds of peaches, with their stones; macerate them for twenty-four hours with four and three-fourths gallons of ninety-five per cent. alcohol and four gallons of water; strain, press and filter; add five pints of white plain sirup; color dark yellow with burnt sugar coloring.

PEPPERMINT BRANDY. Take forty gallons of proof spirit, add four ounces essence of peppermint dissolved in ninety-five per cent. alcohol; color with half pound powder of turmeric infused in one gallon of ninety-five per cent. spirit; use this infusion in such quantity as to get the proper shade.

Brass and Copper Utensils. Many lives have been lost in consequence of carelessness in the use of these utensils. Thoroughly cleanse with salt and hot vinegar, brass and copper, before cooking in them, and never suffer any oily or acid substance, after being cooked, to cool or remain in any of them. Take one ounce of oxalic acid, three-quarters of a pint of New England rum, and three-quarters of a pint of oil. Put the mixture into a bottle, cork it close, and let it stand two or three days before using it. It should be shaken occasionally. Rub the brass with a clean woolen cloth, dipped into a small quantity of this liquid, then rub it with dry rotten stone with another cloth. The bottle should be labelled as poison. At the present day brass and copper utensils are superseded by the greatly superior granite-ware.

Breachy, apt to break fences and get into or out of enclosures; said of live stock. See respective animals.

Bread. In order to secure good bread, it is best economy to purchase the best flour, even at greater cost. Newly ground flour, which has never been packed, is much superior to barrel flour. Indian meal, also, is much the best when freshly ground. Ground rice is best if picked over, and then washed and prepared like the wheat. Rye flour is very apt to be musty or grown. No one thing is of more importance in making bread than thoroughly kneading it. When bread is taken out of the oven, never set it flat on a table, as it sweats the bottom, and acquires a bad taste from the table. Always take it out of the tins, and set it up edgewise, leaning against something. If it has a thick, hard crust, wrap it in a cloth wrung out of cold water. Bread made of wheat flour, when taken out of the oven, is unprepared for the stomach. It should go through a change, or ripen before eaten. Bread will always taste of the air that surrounds it while ripening—hence it should ripen, where the air is pure. It should be light, well baked, and ripened, before it is eaten. In summer, bread should be mixed with cold water; in damp weather the water should be tepid, and in cold weather quite warm.

Rice flour added to wheat flour enables it to take up an increased quantity of water. Boiled and mashed potatoes mixed with the dough cause the bread to retain moisture, and prevent it from drying and crumbling. Rye makes a dark-colored bread; but it is capable of being fermented and raised in the same manner as wheat. It retains its freshness and moisture longer than wheat. An admixture of rye flour with that of wheat decidedly improves the latter in this respect. Indian corn bread is much used in this country. Mixed with wheat and rye, a dough is produced capable of fermentation, but pure maize meal cannot be fermented so as to form a light bread. Its gluten lacks the tenacious quality necessary to produce the regular cell-structure. It is most commonly used in the form of cakes, made to a certain degree light by eggs or sour milk and saleratus, and is generally eaten warm. Indian corn is ground into meal of various degrees of coarseness, but is never made so fine as wheaten flour. Bread or cakes from maize require a considerably longer time to be acted upon by heat in the baking process, than wheat or rye. If ground wheat be unbolted, that is, if its bran be not separated, wheat meal or Graham flour results, from which Graham or dyspepsia bread is produced. It is made in the same general way as other wheaten bread, but requires somewhat peculiar management. Wheat meal, and especially if it is ground coarsely, swells considerably in the dough, and therefore the dough should not at first be made quite so stiff as that made of superfine flour; and when it is raised, if it is found too soft to mold well, a little more meal may be added. It should be remarked that dough made of wheat meal will take on the acetous fermentation, or become sour sooner than that made of fine flour. It requires a hotter oven, and to be baked longer, but must not stand so long after being mixed, before baking, as that made from flour.

Good yeast is essential in making bread. It can either be made out of potatoes or hops, viz.: Boil potatoes soft, peel and mash them, and add as much water as will make them of the consistence of common yeast; while the potatoes are warm put in half a teacupful of molasses, and two tablespoonfuls of yeast. Let it stand near the fire until done fermenting, when it will be fit for use. Or,

Boil a handful of hops in two quarts of water; strain, and pour the liquor hot upon half a teacupful of wheat flour. When about milk warm, add one teacupful of yeast. Let it ferment, when it will be ready for use and may be bottled.

For the yeast cakes, take a large handful of hops, tie securely in a cloth; pare three large potatoes; put hops and potatoes in a quart of water and boil until potatoes are done; take them and mash fine; pour the hop water over them, thicken with corn meal; when cool stir in two good yeast cakes, or one cup of soft yeast; when light add more meal (never use flour) until hard enough to roll out; roll a quarter of an inch thick and cut with a biscuit cutter; lay on tins or on a clean board under the stove; when dry they are ready for use. The night before you are ready to bake, take the amount of water you wish, thicken with flour, stir in two of your yeast cakes well soaked, let stand till morning; then take the sponge, a tablespoonful of salt, one quart of water (never use milk in warm weather), mix hard and let rise twice; make in loaves; when light bake in moderate oven over one hour. In cold weather, set the sponge at noon and mix at night; then you get your bread baked early in the morning.

"Bread Preparation," sold in some groceries, seems to work very well, but on account of its liability to adulteration, it is safe to avoid using it. All "baker's" bread is adulterated with alum, sometimes with other drugs and common dirt, and should never be eaten.

STANDARD WHITE BREAD. The day before you bake, either in the morning or at dinner time, or, if the weather is warm it will do at tea time, boil about a dozen good-sized potatoes pared, mash them in the water in which they were boiled, and rub them through a coarse sieve; have enough water to make it quite thin; when cool, add a handful of yeast-cakes which have been soaked in warm water. In a few hours this will be very light, and ready for use any time. Early the next morning fill the bread-bowl with flour; salt, then pour in the potato mixture, with enough warm water to mix the flour; knead just long enough to make a smooth dough; set by the stove, and cover with a warm blanket; usually it will be light enough to mold into loaves in less than two hours, when you should endeavor to get it into the oven at just the right lightness.

Another: Put seven pounds of flour in a deep pan; make a hole in the center of the flour, into which pour one quart of warm water, in which has been dissolved one cake of compressed yeast. Now, with a large spoon beat the mixture well, cover the flour, and set to rise in a warm place. In two or two and a half hours it will be ready for kneading. Dissolve a handful of salt in about three pints of warm water, with which make the whole into a soft, smooth dough. Knead well with the hands, and set to rise for two or three hours. Then work, and make into loaves; set these to rise about two or three hours; then bake in a good hot oven.

CREAM TARTAR BREAD. One quart of flour; two teaspoonfuls of cream tartar; one of saleratus or soda; two and a half cups of milk; bake 20 minutes. Rub the flour and cream tartar well together; dissolve the saleratus or soda in the milk; wet the flour with it; bake immediately. Water can be used in place of the milk, but the bread will not be quite so rich. This also makes good pie-crust or biscuit.

MILK BREAD. One pint of boiling water, one pint of new milk, one teaspoonful soda, the same of salt, flour enough to form a batter; let it rise; add sufficient flour to form a dough, and bake immediately.

SOUR-MILK BREAD. Have ready the flour; sweeten the milk with a little saleratus; add a little salt; make it rather soft, and pour it into the pan and bake it.

BREAKFAST ROLLS. Two quarts of flour, two tablespoonfuls of white sugar, two tablespoonfuls of cold lard; rub these thoroughly together, then add a pint of scalded milk, partly cooled, and two-thirds cup of yeast; mix milk and yeast with two-thirds of the flour, and set in warm place to rise. When light mix all together, and mold thoroughly, and let rise again. When very light roll out with as little flour as possible; cut in shape, rub melted butter over the top, fold together, and bake.

GRAHAM BREAD. Take two cups buttermilk or sour milk, one-half cup of best sugar-house sirup, one teaspoonful of soda, half teaspoonful of salt. Stir with a spoon to a stiff mass (not too stiff, or the bread will be too hard); put it into a three-pint or a two-quart basin, well buttered; put into a steamer over cold water, which gives the loaf more time for rising. Steam about an hour; then place it in the oven just long enough to give it a good rich brown color.

Another: Take one quart of graham flour at bed-time; scald it thoroughly, and, after it cools, mix in a cupful of good yeast (potato preferred); cover with flour (dry), and set in a warm place to rise. In the morning add a teacup of warm milk and six dessert spoonfuls sirup or two-thirds of a cup of sugar. If you use sirup it will need an even teaspoonful of soda to counteract acidity. Make up in a sponge, and let rise till light; then make one large loaf in a shallow kettle, if you have one. Let it rise till light; then bake one hour in a moderate oven. If preferred, it may be placed in a pan and steamed for two hours.

GRAHAM GEMS. The old method is to make a thin batter of Graham flour, with sour milk and soda, sometimes shortening, salt (and an egg to one dozen gems); put it into hot, well-greased patty-pans, and bake in a quick oven for about 20 minutes. But—

Another: The standard kind among the modern "Hygienists" is made as follows: Take freshly ground graham flour (made from sound white wheat and ground soon after the millstones have been sharpened, as the hulls are much finer cut, is the best); sift through a very coarse sieve, which will remove only what whole hulls there may be in the flour; mix the graham flour with sweet milk, to a batter a little stiffer than for griddle-cakes, but which will quickly pour from the spoon, and smooth on the surface; stir till all is well mixed and no need of more stirring; bake in cast-iron gem pans; put the pans on top of the stove, and grease well with a little mop; heat them as hot as they will bear without burning off the grease; fill them quickly with the batter, dropped from the spoon, and put them into a hot oven, much hotter than for fine-flour biscuits, and have it the hottest when the gems go into the oven, and let the heat gradually diminish toward the last of the baking; the sudden heat crusts them slightly, and the confined gas lightens them; the heat should be as nearly equal above and below as possible, and cold draughts of air from opening the oven door should be avoided. Let them bake about 20 minutes, or until they become a nice brown; if the crusts seem hard upon taking them up, put them on a plate and turn a tin pan over them a few minutes, which will soften the crusts. They may be eaten hot without disturbing the most delicate stomach. They would be just as light mixed with water instead of milk, but not quite so tender; part of each does very well, and a little fine corn meal and sweet cream are an improvement. Any one who will follow these directions strictly and practice a few times, will find they have such delicious gems that all the family will prefer them to any other kind of bread.

OATMEAL GEMS. Mix a cup and a half of oatmeal, half a cup of corn meal and a cup of flour with two cups of sour milk; add a tablespoonful of shortening, two of sugar, a teaspoonful of salt, and a teaspoonful of soda dissolved in a tablespoonful of boiling water; heat the muffin tins and bake in a hot oven.

RYE AND INDIAN, OR BROWN BREAD. For each good-sized loaf being made take one and a half pints corn meal, and pour boiling water upon it to scald it properly; let stand until only blood warm; then put about one quart of rye flour upon the meal, and pour in a good bowl of emptyings, with a little saleratus dissolved in a gill of water, kneading in more flour, to make of the consistence of common bread. If you raise it with yeast, put a little salt in the meal, but if you raise it with salt risings, or emptyings, no more salt is needed. Form into loaves, and let them set an hour and a half, or until light—in a cool place in summer, and on the hearth or under the stove in winter—then bake about two hours. Make the dough fully as stiff as for wheat bread, or a little harder, for if made too soft it does not rise well. The old style was to use only one-third rye flour, but it does not wear if made that way; or in other words, most persons get tired of it when mostly corn meal.

STEAMED BROWN BREAD. One pint of sifted corn meal, one pint of flour, one pint of buttermilk, one teaspoonful of saleratus. If preferred sweetened, one-half cup of molasses is used. Steam two hours and serve hot.

RYE BREAD. Make a sponge as you would for wheat flour. When light, stir in rye flour as stiff as you can with a paddle or large iron spoon. Put it in the baking pans, and let it get very light before baking. A little sugar improves it.

RICE BREAD. Boil one pint of rice soft, add one pint of yeast, then three quarts of wheat flour; put it to rise in a tin or earthen vessel until it has risen sufficiently; divide into three parts; then bake as other bread, and you will have three large loaves.

PUMPKIN BREAD. Take a pumpkin and boil it in water until it is quite thick, then add flour so as to make it dough.

CORN BREAD. Take one quart of sweet milk, corn meal enough to thicken, three eggs, half a cup of butter, two tablespoonfuls of brown sugar, one teaspoonful of soda and two of cream of tartar; bake in a moderate oven one and a half hours.

Southern Style. The main difference is, wet the meal and set it where it will keep warm, and it will by its own tendency to ferment become light without any yeast or saleratus. Then steam, boil or bake it, as you desire, at once, and you will have the nicest and most wholesome pone, or corn dodgers, or hoe-cake that can be made from corn meal. One thing may cause you trouble: it must be watched very closely, for it sours very quickly after it is light.

CORN PONE. Make one quart of corn meal mush in the usual way, except extra salting; take from the fire and add one quart of cold water and meal enough to make it very stiff; set in a warm place to rise, and when light bake in an oven with a tight lid. This is genuine corn pone.

USES OF STALE BREAD. 1. To make dressing for meat—Crumb it fine; turn hot broth over it; season, add butter, and a well-beaten egg, or more, according to quantity. 2. Make bread pudding—Soak two hours in sweet milk; then beat eggs, sugar and spices, and bake; sometimes add fruit. 3. Make biscuit—Soak over night in sour milk;

mash fine with the hand; mix in your biscuit for breakfast, adding salt, lard and soda. They are better than without the stale bread. 4. Make pancakes or gems—Soak over night in sour milk; add well-beaten eggs, flour, corn meal or graham flour to make a batter; add soda and salt and bake on a griddle or in gem-pans. 5. Crumb fine and put in the next omelet you make. 6. Toast your bread, set a pan of milk on the stove, but do not remove the cream from it; add butter and salt; dip the bread in this, and send to the table for supper or tea. 7. Crumb fine and put in your tomatoes when you are stewing them. 8. Batter bread—Take half a cup of bread crumbs soaked in a pint of milk, and two eggs; beat this to a smooth batter; add two cups of Indian meal, one teaspoonful of salt and one tablespoonful of butter; stir all together very hard, and bake in shallow tins very quickly. 9. Toast dry, and serve either dry or dipped in hot water, and eat with sauce, meat, or both.

As far as possible, have pieces of bread eaten up before they become hard; spread those that are not eaten, and let them dry, to be pounded for puddings, or soaked for brewis. Brewis is made of crusts and dry pieces of bread soaked a good while in hot milk, mashed up and eaten with salt. Above all, do not let crusts accumulate in such quantities that they cannot be used. With proper care there is no need of losing a particle of bread.

FRIED BREAD. Beat four eggs very light, add three tablespoonfuls of good brown sugar, a little grated nutmeg, a tablespoonful of orange or rose water, and a quart of milk. Cut into nice slices an inch thick, a stale loaf of bread; remove the crust from the sides, and cut each slice into halves. Butter your frying-pan, and when hot, lay in your bread (dipped in the custard) and brown on both sides. Lay them on a hot dish and sprinkle over them a little loaf sugar.

Another: Slices of toasted bread dipped in milk or wine and fried in honey are excellent. Then, instead of calling them "fried bread," they are *torejas*, an excellent Spanish delicacy. Please understand that there is neither butter nor lard. Simply melt the honey in a pan, and when it is very hot put in the bread, which is served hot also, after becoming nicely browned. See also Biscuit and Cakes.

Bread may be PRESERVED for long periods by cutting it into thick slices and baking it in an oven until perfectly dry. When on a journey this dried bread may be dipped an instant into hot water, redried and eaten with butter. The taste will be like that of toast.

Break. To "break" a horse is to reconcile him to the use of the saddle or harness, that he may be made serviceable to man. Also, a "break," a stout two-wheeled vehicle used in breaking horses. To "break" a piece of ground is to plow it up thoroughly, either from its primeval condition or after it has settled for a season.

Breast, INFLAMMATION OF. The breasts of females are sometimes inflamed, swelled, and subject to abscesses. In mothers these affections are painful, and prevent the flow of milk. A swelling in the breast may be reduced by applying spirits of camphor or the adhesive strengthening plaster. If there be chill it must be removed by perspiration. Take one teaspoonful of best rum, one teaspoonful of ginger, one-quarter teaspoonful of cayenne pepper; boil four or five minutes, and thicken with coarse flour or ground elm bark, or slippery elm; put a little oil upon the breast, then apply the poultice, and repeat three or four times. If the pain be excessive, add a small quantity of laudanum to the poultice. This generally cures. In hard swellings of the breast, rub with sweet oil, or friction with soap liniment; one dram of compound tincture of iodine to each ounce will render it more effectual. The bowels should be kept gently open to subdue the fever. When matter has formed, it is best to let it break and discharge spontaneously; or it may be punctured with a lancet. An abscess in the breast will discharge for a long time. The diet, therefore, should be nutritious, light and strengthening. A warm bread poultice is good for an abscess; it should be changed every four or five hours, and covered with oiled silk. When the discharge has nearly ceased, simple warm-water dressings may be substituted. Or, boil a handful of chamomile and as much mallows in milk and water. Foment with it between two flannels, as hot as can be borne, every twelve hours. This also dissolves any knot or swelling in any part. Or, take one-half dram of powdered gum arabic, ten grains of borax and one dram of tincture of myrrh. To hard breasts, some apply roasted turnips, mashed and mixed with a little oil of roses.

Any disease of the breast is a delicate matter to experiment with, and it is generally safer to consult a modern physician.

Breast Pang. Take a warm-water emetic, abstain from food, rub the chest and remain composed as possible.

Breast Wheel. A water wheel, where the current is delivered upon it about one-half or two-thirds its height, which distinguishes it from "overshot" and "undershot" wheels.

Breath, IMPURE. There are few things more offensive than a foul or fœtid breath, not only as a source of annoyance to the person himself, but a positive nuisance to all who have the misfortune to approach him. Impure breath, except in cases of illness, and when the patient is under a course of mercury, proceeds from two causes—a neglected state of the stomach and bowels, or from decayed teeth and an unclean mouth; and as in either case the remedy is easy, it must be owing to an innate disregard for others' comfort, and neglect of his own, that any person allows so noxious an offense to continue. To counteract such exhalations, almost the only substance that should be admitted at the toilet is the concentrated solution of chloride of soda; from six to ten drops of it in a wine-glass of pure spring water, taken immediately after the operations of the morning are completed. In some cases the odor arising from carious teeth is combined with that of the stomach. If the mouth is well rinsed with a teaspoon of the solution of the chloride in a tumbler of water, the bad odor of the teeth will be removed. See also Teeth and Hygiene.

For breath tainted by ONIONS, it is said that eating leaves of parsley with vinegar is a good thing.

Breath, SHORTNESS OF. Take of vitriolated spirits of ether, one ounce, and of camphor, twelve grains. Make a solution, of which take a teaspoonful during the paroxysm. This is usually found to afford instantaneous relief in difficult breathing, depending on internal disease, and other causes, where the patient, from a quick and very laborious breathing, is obliged to be in an erect posture. Or, take one-quarter ounce of powder of elecampane root, one-half ounce of powder of licorice, as much flour of brimstone and powder of anise-seed, and two ounces of sugar-candy powdered. Make all into pills, with a sufficient quantity of tar; take four large pills when going to rest. This is an incomparable medicine for asthma.

Breech, OF A GUN, is the butt of the stock, which in firing is placed against the shoulder. A "breech-loading" gun is one which is loaded at the juncture of the breech with the barrel. "Breech wool" is the coarse, short wool which is taken from the hinder quarters, or breech, of common sheep.

Breeching, that part of the harness which extends around the breech, or hind-quarters, of an animal, enabling him to push backward the vehicle to which he is attached.

Breeding, in a pastoral sense, is the propagation of animals; also, in a more restricted sense, the propagation of good breeds, on scientific principles, for the improvement of the stock.

All breeding is founded on the principle that like begets like. This is, however, liable to some exceptions, and is much more generally true when breeding down than when breeding up. If two animals which can never be exactly similar in all respects, are requisite to the perpetuation of the species, it necessarily results that the progeny must differ in a more or less degree from each parent. With wild animals and such of the domestic as are allowed to propagate without the interference of art, and whose habits, treatment and food are nearly similar to their natural condition, the change through successive generations is scarcely perceptible. It is only when we attempt to improve their good qualities that it is essential carefully to determine, and rigidly to apply what are adopted as the present scientific principles of breeding. We cannot believe that we have penetrated beyond the mere threshold of the art. Unless, then, we launch into experiments, which are necessarily attended with uncertainty, our duty will be to take for our guide the most successful practice of modern times, until further discoveries enable us to modify or add to such as are already known and adopted. We may lay down, then, as the present rule for this art:

1. That the animals selected for breed should unite in themselves all the good qualities we wish to perpetuate in the offspring.

2. These qualities, technically called "points," should be inbred in the animals as far as practicable, by a long line of descent from parents similarly constituted. The necessity for this rule is evident from the fact that in mixing different species, and especially mongrels, with a long established breed, the latter will most strongly stamp the issue with its own peculiarities. This is forcibly illustrated in the case of the foreign cattle of ancient races, whose color, form and characteristics are strikingly perpetuated, sometimes to the sixth or even a later generation. So far is this principle carried by many experienced breeders, that they will use an animal in different external appearance, but of approved descent (blood) in preference to a decidedly superior one, whose pedigree is imperfect.

3. All the conditions of soil, situation, climate, treatment and food should be favorable to the object sought.

4. Perfect health, and sound constitution in the breeding animals, and freedom from blemish either inherent or chronic.

5. As a general rule, the female should be relatively larger than the male. This gives ample room for the perfect development of the fœtus, easy parturition, and a large supply of milk for the offspring, at a period in its existence when food has a greater influence in perfecting character and form than at any subsequent time.

6. Exceptions to this rule may be made when greater size is required than can be obtained from the female, and especially when more vigor and hardiness of constitution are desirable. For this purpose, strong, masculine development in the sire is proper, and, if otherwise unattainable, something of coarseness may be admitted, as this may be

afterward corrected; but nothing will atone for want of constitution and strength.

7. Pairing should be with strict reference to correcting the imperfections of one animal by a corresponding excellence in the other.

8. Breeding in and in, or propagating from animals nearly allied, may be tolerated under certain circumstances. When the animal possesses much stamina and peculiar merit, which it is desired to perpetuate in the breed, it may be done either in the ascending or descending line, as in breeding the son to the parent, or the parent to his own progeny. This has been practiced with decided advantage, and in some cases has been continued successively as low as the sixth generation.

9. Yet, with inexperienced breeders it is usually better to avoid close relationship, by the selection of equally meritorious stock-getters of the same breed from other sources, unless the breeder be a perfect master of the art of close breeding. It requires the soundest judgment and long experience to long follow in-and-in breeding with entire success.

10. Wholesome, nutritious food, at all times sufficient to keep the animals steadily advancing, should be provided, but they should never be allowed to get fat. Of the two evils, starving is preferable to surfeit. Careful treatment and the absence of disease must be always fully considered.

11. Animals should never be allowed to breed too early or too late in life. These periods cannot be arbitrarily laid down, but must depend on the time of maturity, the longevity of the breed and the stamina of the individual.

12. No violent cross or mixing of distinct breeds should ever be admitted for the purpose of perpetuation, as of cattle of diverse sizes; horses of unlike characters; the Merino and long wools, or even the long or short and the middle-wool sheep. For carcass and constitution, the last-named crosses are unexceptionable, and it is a practice common in this country, and well enough, where the whole produce is destined for the shambles; but when the progeny are designed for breeders, the practice tends to a total uncertainty in fixed character and quality.

If an animal is capable of transmitting any characteristic to its young, it must, of course, possess that characteristic itself, although now and then qualities may predominate in the offspring which were almost or quite latent or hidden in the parent, but were manifest in some of the ancestry. Now, if any characteristic quality becomes hereditary in an animal, it must correspond with a similar quality inherent in the parent from which it descended. But if we breed from a female of certain qualities by a male of an opposite character, so far as these peculiar qualities are concerned, we cannot expect to perpetuate in the offspring both characteristics. We should obtain a result which might appear to contradict the maxim that "like produces like." And here we come at once upon one of the leading principles in the breeding of all stock,—that though "like produces like," and can produce nothing else, when the two parents possess opposing or unlike qualities, the one which possesses the strongest hereditary qualities, or the strongest power of transmitting his qualities, will gain a preponderating influence over the offspring. Take, for instance, a cow with some special peculiarity of form, and put her to a bull having points of form quite opposite in this respect, and the calf will take the character, so far as this peculiarity of form is concerned, of the parent which possesses the greatest hereditary power, or the greatest purity and unity of influence—what we may call fixity of type. And these hereditary powers are very largely under our control, to be increased or diminished by our own course of action.

If we take two animals to breed together, both possessing a strong similarity of type, the result we shall have will be an offspring possessing the like character, but in a higher degree. The result of putting together two animals of a strong similarity of characteristics is not only to perpetuate their corresponding peculiarities, but to intensify them in the offspring; that is, if the parents actually possess a striking similarity of type in any given point, each successive generation which they produce receives an increase of hereditary force, or an increase of power in transmitting its peculiar stamp upon its young. It is a cumulative power. But if this hereditary power accumulates, and becomes stronger and stronger, with a strong similarity in the parents to start from, it absolutely and invariably diminishes, if the parents, instead of possessing similarity of character, really possess an opposite or antagonistic character.

It reminds one of the familiar and well-known principle of mathematics, that two plus or positive quantities multiplied together will produce a far larger plus or positive quantity as the product; while if we multiply two unlike quantities, a plus and a minus, for instance, the result will be a minus, or negative quantity. Suppose, for example, we have a well-bred ram, that, by long and careful breeding through several generations, has acquired certain strong and valuable hereditary powers; and suppose these powers, for the sake of illustration, are equal to 100, if they could be expressed in figures. Now, suppose we put this ram to a ewe of a different character, one that has been cross bred, or bred without any care or system—very much as our native sheep or our common cattle have been bred. She has, of course, far less hereditary power; far less fixity of type and strength of blood, as we say. Her hereditary power may be represented, we will suppose, by 60.

The result would be a lamb possessing very much the same characteristics as the ram, because we have seen the ram possessed a greatly superior hereditary power. To the eye he may look very like his father; but the hereditary capacity of this lamb will be greatly reduced, and his power of transmitting his peculiar characteristics will be represented by 100—60=40. He may still look to the eye about as good as his father; but he will possess less than half of his father's hereditary power, and less even than that of his mother's. In other words, he may have all the perfection of form and marked characteristics, but his power of transmitting these peculiarities will be only in the proportion of 40 to 100, and for a breeding animal to get stock from he will be worth less than half as much as his sire.

In other words, if you select animals of a similarity of type, that is, if the likeness is strongly marked and well developed in both parents, the young will not only possess the same character as the parents, but it will possess an increased or multiplied power of hereditary transmission of these characteristics. But opposite characteristics mutually weaken each other's influence, and the offspring will have the power of hereditary transmission only in a greatly reduced degree. The exact proportion of this reduction of the power of transmission, or hereditary power, may not be precisely like that stated above, but it will correspond with it in the main, and sufficiently for illustration.

These are a few general and well-established principles which have been arrived at by the most skillful and scientific breeders during the last half or three quarters of a century; and it would be idle to dispute them or to deny their force.

We are to bear in mind, also, that capability of transmitting the qualities or characteristics from the parent to the offspring is not limited to any one peculiarity of the animal—like the secretion of milk, the disposition to take on fat, the strength of constitution, the likeness of figure, or the habit of growth—but extends to all the characteristic points of the parent animal. All the peculiarities of the system, physical and constitutional, are very largely within our control; and the character which results will be governed by the tendencies of the parents we select to breed from, and will depend on the adjustment of the balance of qualities, sometimes inclining to the side of one parent and sometimes to the other, according to the respective power of transmission which has been spoken of.

If this power largely preponderates in one parent, owing to the length of time in which it has been carefully bred, or the number of generations through which it has become fixed and intensified, while it has been broken and weakened in the other by cross or promiscuous breeding, the character of the offspring will be governed almost exclusively by the parent that has the stronger blood; while the other will have but slight influence over the qualities of the offspring. But if there is a more even adjustment of this power of transmission on the part of the parents—that is, if they are nearly or quite equally well bred—the dam will succeed in imparting some peculiarities, and the sire will communicate others. The dam may impart the general form of the body, for instance, but be unable to control or overcome the stronger power of the sire over certain points of the body. The dam, for example, might have slightly deficient hind-quarters, and the sire a strong tendency to impart a good hind-quarter; and in this respect she would be compelled to yield to the superior strength of influence. In those points of character or features where they correspond, or were similar, both being good or both being bad, the result would be to increase and intensify such points, and to reproduce them in a still stronger form. In some particulars the influence of the male will predominate; in others, that of the dam. So we see the hereditary qualities of long and carefully bred stock will represent the maximum of good qualities and the minimum of undesirable ones.

The first and most obvious rule is to *breed only from the best*,—not merely the best-looking, the animal that strikes and fills the eye the most completely, but from the one that has the hereditary power, the capacity to transmit his good qualities in the highest degree to his offspring; and the strongest evidence of this power will be the length and perfection of his pedigree, showing the qualities of his ancestors for some generations back, unless, indeed, some of his stock can be seen to tell as plain a story to the practiced eye of a judge of stock.

We have often heard practical men, intelligent men, who profess to know something about stock, and who ought to know better, say: "I don't care anything about your pedigree; let me see the animal, and I can tell whether I want to breed from him or not." Let us not deceive ourselves by any such assumption, from whatever source it may happen to come. It will be sure to lead to frequent disappointment; for, as we have shown, an animal may possess an almost faultless form, and strike the eye of even the most experienced judge as possessing remarkably fine qualities, and indeed really possess them, and yet have no fixity of type, no great hereditary power; when, if put to a low or ill-bred female, he will be more likely than not to get poor stock, or, at any rate, there will be no reasonable certainty of transmitting his own qualities.

The importance of the greatest care in the selection of the male will be apparent from the fact that his influence extends to a far more numerous progeny. He should not only possess in the highest degree the good qualities sought after in the class of animals to which he belongs, but he should possess the power of transmitting them in the highest degree; and as this power is latent or hidden, and does not appear to the eye, it is to be judged either from the stock already got, or more commonly from the qualities of his ancestors through several generations. And here, again, the quality of the pedigree—that is, the quality of the ancestry—is more important than its length. It is of little use or satisfaction to trace a pedigree back through inferior or ill-bred stock, except as a warning against the use of the male at the end of it.

At the same time, the longer it is the better, provided it shows a high character in the ancestry; for we have seen that the hereditary power, or capacity for transmission, is cumulative; that is, it becomes stronger, and more intense and fixed, from generation to generation, where the respective parents possess similarity of characteristics, as is commonly the case in our well-established breeds.

I have said that the choice of the male to breed from is of special importance, because of the great extent of his influence; that is, the very large number of his offspring in proportion to that of the female, among our domestic animals. But it is well established now, that the influence of the male imparts vigor of body and the general conformation of the system, especially of the forward parts, and that he transmits to his progeny the qualities of the mother by which he was born. A well-bred bull dropped by a first-rate dairy cow will produce a calf that will make, if a heifer, another good dairy cow. He will transmit to his daughter the qualities of his mother, if he have well fixed in his constitution the hereditary power of which I have spoken. In breeding dairy stock, therefore, it is of the utmost importance to study and to know the quality of the stock from which the male has descended.

The animal in a wild state, or in a state of nature, has stronger reproductive powers, greater energy of the system and constitution, than one long under the influence of domestication. The natural laws are to some extent interfered with by the efforts we have to make to establish and perpetuate certain peculiarities of the animal system, the extraordinary development of which is unnatural and artificial, but which development may be essential to our interests. The tendency to secrete milk is a natural one, found in all animals that suckle their young; but the extraordinary development of milking powers is artificial. In the wild state the cow yields milk for only a short time, and that only in sufficient quantities, probably, to nourish her young. As we recede from this wild condition by domestication, and subject the animal to a variety of circumstances which modify her form and system, we do it at the expense of certain qualities, for the sake of gaining other qualities better calculated to promote our immediate interest. The reproductive powers become weaker; the vitality and vigor of constitution lessened; but the formation of fat, or the tendency to produce meat, and the profitable production of milk, may be largely increased. That high breeding has this tendency to diminish the vital force and strength of constitution, is apparent enough when we consider how utterly absurd it would be to attempt to pit an improved Short-horn bull against a rough and ill-bred bull in a Spanish arena. He would have the improvement knocked out of him before he had time to turn around.

Good dairy qualities, therefore, being artificial to a great extent, there will always be a natural tendency to revert to the natural state; and hence the necessity of constant and unremitting care to preserve and improve by the methods already intimated what we have already gained,—that is, by the most careful selection of the animals from which we propose to raise dairy stock, especially to have the male from a family remarkable for milk.

It is a fact well known among farmers, that in all classes of stock, as cows, ewes, sows, etc., a strong disposition to accumulate fat in the system is commonly attended by a marked deficiency in the secretion of milk; and there can be no doubt that the general structure of the animal exercises an important control over the quantity and richness of the product in milk.

This must be evident from the fact that the first process which the food taken into the system is made to undergo after digestion is the separation and preparation of the fatty and nutritive parts, so as to introduce them into the circulation of the blood. In some animals this process apparently goes on with less loss than in others; but the rapidity with which the elements of food pass on into the circulation of the blood is plainly seen in the shortness of time it takes to show itself in the various secretions of the body. Thus certain plants or other substances taken into the stomach half an hour previous to milking will perceptibly affect the taste and quality of the milk. If you administer a dose of aloes to a horse in the form of a ball wrapped up in paper, and within twenty or twenty-five minutes after put a bullet through his head, and dissect him, you will find the paper left in an undigested mass in the stomach; but you will find traces of the aloes far along at the very mouth of the large intestine. It has dissolved and entered with wonderful rapidity into the circulation of the system. That has been tried time and time again. It is related, also, that an ox going to the butcher caught up an onion and ate it. In a very short time he was knocked in the head, when it was found that the onion had tainted the whole body.

Juicy food causes the milk to be thin and watery as well as abundant, showing that there must be a diffusion of water directly from the blood. It is incredible that such great quantities of water could be obtained from the decomposition of the gland-cells; and, as water constitutes by far the largest part of milk, it is practically correct to describe it as a secretion from the blood, even if we admit that the milk solids have their origin in the decomposition of the mammary glands.

Now, if the blood is poor, thin and watery, if it is but slightly charged with the fatty elements which have been taken up in the food, the quality of the milk secreted from this blood must of necessity be poor, because the quality or richness of milk is supposed to depend on the amount or proportion of fatty constituents, or what is more commonly known as cream and butter. And you will generally find that the quality bears an intimate relation to the quantity produced.

The second step in the process of assimilation is, therefore, the separation of a larger or smaller proportion of these fatty elements in the blood, in the form of milk, the richness of which will be governed very materially by the food and by the perfection, the completeness, with which the fatty elements have been separated from the food, and enter into the circulation of the blood.

The economical preparation of the raw material of the food is equally important for the fat in the blood, whatever may be the ultimate form into which the animal system is to convert it; and the internal structure which accomplishes this process differs widely in different individuals, so that one animal will effect this separation, preparation, or elimination, completely, with the least possible loss or waste of food; while another will fail to extract the fatty elements of the food, and allow them to pass on to be excreted with the other cast-off wastes of the body; and we see, also, that animals best formed for fattening are also best formed to fulfill the first condition essential for the production of rich milk.

The object in breeding stock for the dairy, therefore, is to stimulate the mammary glands to the greatest possible activity, to increase their natural energy and power of secretion, and to prolong their period of activity. Now, they are so largely subject to hereditary influence, that great progress has been made in increasing their power to perform their natural functions, as we see in the establishment of various breeds of cattle remarkable for milking qualities; while a neglect to develop and encourage the functions of these glands has in some breeds so far reduced their energy and activity, that whole classes of animals—like the Herefords, the Devons, and, to some extent, the Short-horns—have ceased to yield milk in quantities to be profitable upon the dairy farm.

In those breeds where the tendency to produce meat has been encouraged, where the yield of milk has been overlooked, and sacrificed to early maturity, we could, no doubt, by judicious management, bring the condition of the mammary system to its required standard of efficiency, and even elevate this standard to a high degree; but we should probably injure or reduce the tendency to the economical supply of meat. We should impair the value of certain very important qualities which have been highly developed for specific purposes, and should get only what we find already highly developed in other breeds, viz., a tendency to the largest production of milk. Not that the two qualities are irreconcilable or incompatible in the same animal, but that they have not as yet been combined with any degree of success in the meat-producing breeds. We find generally in practice that a cow that produces a large amount of rich butter will, when the secretion of milk falls off, feed most profitably for the butcher, unless there are other counteracting or objectionable peculiarities.

The second object we have in breeding stock is the production of meat; and while upon the general principles of breeding, let us allude to the difference between breeding for the production of milk and for the production of meat. For the latter, a large part of the success to be expected will depend upon management and attention to feeding. It is absolutely essential to keep the animal in a thriving condition from its birth; but still we can exert a powerful influence over the natural predisposition of the animal. We are to choose a female that yields an abundant supply of milk. An animal—a cow, for instance—that yields a liberal supply of milk will nourish the *fœtus in utero* more completely, and bring larger calves; her offspring will be fatter, finer, and in far better condition at birth than that of a poor milker. A cow that has a strong predisposition to form fat, and secretes little milk, will almost invariably bring a puny calf, and one out of all proportion to the size and condition of its dam. The cows of the breeds most noted for the production of beef, pure and high-bred Short-horns for instance, are far from being the best for raising calves designed especially for the most economical production of veal. A well-formed grade or common cow (if in sound health, and capable of nourishing its young) put to a carefully-bred Short-horn bull whose ancestry through some generations had possessed a strong disposition toward the production of fat and meat, will bring forth a larger calf than a high-bred Short-horn. The bull from such a parentage will possess hereditary powers so strong as to transmit all his essential characteristics to his offspring with as great certainty as if that offspring came from a too finely bred cow. This, of course, supposes her to be large and roomy, and well proportioned in size to the bull. But the bull must have the advantage of a good pedigree or careful breeding.

But it would be a fatal mistake to adopt the opposite course, and to put a high-bred pure Short-horn cow to a low-bred or scrub male; for, though the cow would succeed in stamping her character upon the calf, she could not nourish it so well; she would be less hardy in constitution, and not so certain as a breeder. It is far better to impart through the male in breeding the qualities we want for the production of meat; and, in the economical conversion of vegetable into animal matter, purity of blood is not essential in the offspring.

For the breeding of stock for the most economical production of beef, take, therefore, good fair dairy cows of good size, and put them to a bull of first-rate pedigree, either Short-horn, Devon, or Hereford.

With respect to breeding for purity of blood, the object is to create and preserve a fixity of type, and we must select animals possessing the same characteristics in order that we may invariably reproduce the good characteristics with greater certainty, and in an improved form, in the offspring. If the individual animals be well selected, we shall in every generation gain stronger and stronger hereditary powers and permanence of qualities. We shall concentrate the peculiarities of the race or breed. But we must avoid, as far as possible, any opposing influences in the parents, as tending to weaken the hereditary tendency in the young. We are to avoid anything like crossing, with the strictest care.

With respect to the practice of breeding in-and-in, as it is termed, which comes naturally in this connection, many conflicting opinions have been expressed; and the general conclusion arrived at is, that it is safe only within certain narrow limits, and then only under the hands of the skillful breeder.

Breeding in-and-in is commonly understood as an indefinite term applying to any near relationship; but its legitimate and proper application is to designate animals of the same blood as own brother and sister. But a son is only half the blood of his mother, and a daughter is only half the blood of her father. You may breed such relationship together to a certain extent without injury; that is, you may put a bull to his mother or to his daughter, and greatly concentrate the hereditary power in the offspring. But even this course is to be followed with care and judgment, and not pursued too far. After reaping the first advantages to be derived from it, the breeder will do well to stop and consider. Breeding in-and-in, *i. e.*, own brothers and sisters, will give a more perfect form; but, if carried beyond one generation, it will be at the certain sacrifice of size, and perhaps of the strength of constitution. It greatly weakens the reproductive powers, and often leads to other and still more serious evils. Bear in mind that we refer to own brothers and sisters. More distant relationship can be put together with less risk, of course, and, if carefully watched to discover the least injury to the vigor of constitution, this course may be adopted to some extent where the design is to bring up a pure herd having certain highly important qualities which it is desirable to concentrate and perpetuate. At the same time it should be borne in mind that pure-bred animals have now become so common and so numerous, that it will not be difficult to change the strain of blood sufficiently often to avoid any necessity of breeding from too near relationships. The necessity of breeding from close affinities will rarely exist, except for the purpose of trying to build up a new breed, where, in some instances, it may be unavoidable.

Cross-breeding is the coupling of two animals of different and distinct breeds. Where it is practiced for the sake of getting size and early maturity for the butcher, it is often expedient; but where it is the object to produce animals to breed from, it is never judicious. The use of a pure-bred male upon a mongrel or grade female is not a case of crossing; but the term is often used as between two strains of blood or two families of the same breed. Crossing with the purpose of procuring animals for the butcher offers many important advantages in individual cases; but it is seldom the object upon New England farms. There are few sections in the East, where, in the case of cattle, it is thought desirable to breed especially for the butcher. But the use of a pure-bred male upon a low-bred female will almost invariably succeed, and produce good results.

In breeding for the dairy, we bring the heifers in at two years old; for the reason that, at that age, the organs of secretion, like all parts of the body, are in a more pliant condition than they will be at a later period, and they are consequently more readily influenced. The secretion of milk is well calculated to develop them, and to enlarge them to their utmost capacity. If the animal is to become a large milker when she arrives at maturity, she must have abundant room to lay away large supplies of milk; and the capacity for holding these supplies must be created while her system is pliant, elastic, and easily influenced.

Let the heifer take the bull toward the end of July, in August or early in September, if she will, and you bring the parturition in the following spring, at a time very favorable for the production of milk. In spring the grasses are green, abundant and tender, full of rich milk-producing juices, which cause the largest development of the milk-forming organs.

If, on the other hand, the first parturition of the young heifer takes place in winter, the distension of the udder on dry forage is slight, and the product in milk corresponds. The milky glands will have but slight development. Soon this habit will become a second nature, so to speak, which no amount of feeding can wholly correct. The external signs of a good milker may be there, but the yield does not come up to the production which they indicate; and this fact will often explain an apparent exception to the established rules. A heifer coming in in May or June, and properly treated, will be worth a great deal more as a dairy cow than one coming in with her first calf at any other season of the year.

A heifer coming in at two years old, if properly fed, carefully milked, forced up, if you please, to her utmost capacity of production, and made to hold out almost till the new milk springs for a second calf, will invariably make a better milker than one coming in at three years old. Of course this supposes that the animal, as a calf, has been well fed, and kept in a thriving condition up to the age of a year or fifteen months, when she will go to the bull. She should have a fair development and good growth; and it is better that she should go to a small rather than a large bull. The draught on her system for the nourishment of the fœtus will be less severe than if she is fecundated by a large, over-grown bull.

To offset these great and manifest advantages, there is the liability to some check in her growth and size, owing to the strain upon her system before it has reached its full development. This may be guarded against and counteracted by liberal and judicious feeding; and with this there will be no appreciable difference in size and thrift between such an animal and one brought in at three years old, when they reach the age of four or five.

As to the age of the bull when put to service, our theory and practice are widely different; for, while most intelligent farmers are ready to admit that one year is too young, that the system is not mature, that the animal is not developed, and ought not to be used, they do, in fact, use yearling bulls far more commonly than older ones. If well fed and thrifty, we should not object to a limited use of a bull at fifteen months, and from eighteen months and onward more freely, in getting dairy stock and stock for beef. For getting working cattle, or animals for labor, the bull should be at least two years or two years and a half old. The bull is better to be worked; and if it were our custom to use all our bulls more or less in the yoke, they would undoubtedly be all the better for it.

As to controlling the sex of progeny, the sex of the most vigorous parent will be generally the sex of the offspring.

With respect to the period during what is called the "heat," at which the cow should be put to the bull, no rule can be laid down upon any rational grounds. Perhaps we have too few facts in regard to the effect or influence of a service early or late in the heat. Some farmers think conception is much more likely to take place if the copulation is deferred till near the end of the term; and this is a fact very generally accepted by physiologists.

There is no fixed time during which the "heat," or desire for the bull, continues in the cow; it varies according to condition, age, and many other circumstances. It may last two, three or four days; but sometimes it ceases in 24 hours. In very rare cases it continues 10 to 15 days, and in some cows not more than four, five or six hours. In some cows the length of its duration diminishes with age to such a degree, that it has been known to last only an hour. Conception always causes it to cease, and not unfrequently a copulation that is not fruitful will prevent its recurrence; but usually, if the cow does not conceive, the period of heat will return in 20 or 21 days.

Mental impressions received by the female during the period of the œstrum, or heat, affect the offspring, often to a very remarkable degree.

Now, this peculiar, excited state of the cow is the moment indicated by nature for connection with the bull; and it is generally better to follow nature, and put her to the bull as soon after it appears as practicable.

Some cows will come in heat nearly every month, and it is quite difficult to get them with calf. This often occurs among high-bred cows, or cows kept too fat; but with other cows it indicates an internal scrofulous disease, commonly phthisis or pneumonia. It is better to fat and kill or sell such obstinate cases. To stimulate heat in the cow, as well as in the bull, there is nothing better than more abundant or more nutritive feeding, with some grain, bean, or especially pea meal. Salt stimulates the appetite, and facilitates digestion; and exercise and moderate labor will also excite sexual desire. The better a cow or heifer is fed, the more intense and frequent will be the "heat" till conception takes place. If the "heat" is allowed to pass several times without satisfaction, the fecundity of the animal is injured.

Never countenance the absurd and ridiculous practices in some neighborhoods, of running a cow after copulation, or giving her a cold bath. Never cut off the end of her tail to make her "stick." All these practices are utterly absurd—as absurd as sticking a plug of garget-root into the dewlap to cure garget in the udder.

Breeding Calendar. The following table gives the dates of delivery for the animals named, the date of "covering" being as in the first column. If served Jan. 1, the mare will drop her colt about

Dec. 6; the cow her calf Oct. 12; the ewe her lamb June 3; and the sow her pigs April 30. In the table five days intervene between each date of service given, to save space; therefore, in making your calculations, add the omitted days to those given.

BREEDING CALENDAR FOR HORSES, CATTLE, SHEEP AND HOGS.

DATE OF COVERING,	MARES. 340 Days.	COWS. 285 Days.	EWES. 154 Days.	SOWS. 130 Days.
Jan. 1	Dec. 6	Oct. 12	June 3	April 30
Jan. 6	Dec. 11	Oct. 17	June 8	May 5
Jan 11	Dec. 16	Oct. 22	June 13	May 10
Jan. 16	Dec. 21	Oct. 27	June 18	May 15
Jan. 21	Dec. 26	Nov. 1	June 23	May 20
Jan. 26	Dec. 31	Nov. 6	June 28	May 25
Jan. 31	Jan. 5	Nov. 11	July 3	May 30
Feb. 5	Jan. 10	Nov. 16	July 8	June 4
Feb. 10	Jan. 15	Nov. 21	July 13	June 9
Feb. 15	Jan. 20	Nov. 26	July 18	June 14
Feb. 20	Jan. 25	Dec. 1	July 23	June 19
Feb. 25	Jan. 30	Dec. 6	July 28	June 24
March 2	Feb. 4	Dec. 11	Aug. 2	June 29
March 7	Feb. 9	Dec. 16	Aug. 7	July 4
March 12	Feb. 14	Dec. 21	Aug. 12	July 9
March 17	Feb. 19	Dec. 26	Aug. 17	July 14
March 22	Feb. 24	Dec. 31	Aug. 22	July 19
March 27	March 1	Jan. 5	Aug. 27	July 24
April 1	March 6	Jan. 10	Sept. 1	July 29
April 6	March 11	Jan. 15	Sept. 6	Aug. 3
April 11	March 16	Jan. 20	Sept. 11	Aug. 8
April 16	March 21	Jan. 25	Sept. 16	Aug. 13
April 21	March 6	Jan. 30	Sept. 21	Aug. 18
April 26	March 31	Feb. 4	Sept. 26	Aug. 23
May 1	April 5	Feb. 9	Oct. 1	Aug. 28
May 6	April 10	Feb. 14	Oct. 6	Sept. 2
May 11	April 15	Feb. 19	Oct. 11	Sept. 7
May 16	April 20	Feb. 24	Oct. 16	Sept. 12
May 21	April 25	March 1	Oct. 21	Sept. 17
May 26	April 30	March 6	Oct. 26	Sept. 22
May 31	May 5	March 11	Oct. 31	Sept. 27
June 5	May 10	March 16	Nov. 5	Oct. 2
June 10	May 15	March 21	Nov. 10	Oct. 7
June 15	May 20	March 26	Nov. 15	Oct. 12
June 20	May 25	March 31	Nov. 20	Oct. 17
June 25	May 30	April 5	Nov. 25	Oct. 22
June 30	June 4	April 10	Nov. 30	Oct. 27
July 5	June 9	April 15	Dec. 5	Nov. 1
July 10	June 14	April 20	Dec. 10	Nov. 6
July 15	June 19	April 25	Dec. 15	Nov. 11
July 20	June 24	April 30	Dec. 20	Nov. 16
July 25	June 29	May 5	Dec. 25	Nov. 21
July 30	July 4	May 10	Dec. 30	Nov. 26
Aug. 4	July 9	May 15	Jan. 4	Dec. 1
Aug. 9	July 14	May 20	Jan. 9	Dec. 6
Aug 14	July 19	May 25	Jan. 14	Dec. 11
Aug. 19	July 24	May 30	Jan. 19	Dec. 16
Aug. 24	July 29	June 4	Jan. 24	Dec. 21
Aug. 29	Aug. 3	June 9	Jan. 29	Dec. 26
Sept. 3	Aug. 8	June 14	Feb. 3	Dec. 31
Sept. 8	Aug. 13	June 19	Feb. 8	Jan. 5
Sept. 13	Aug. 18	June 24	Feb. 13	Jan. 10
Sept. 18	Aug. 23	June 29	Feb. 18	Jan. 15
Sept. 23	Aug. 28	July 4	Feb. 23	Jan. 20
Sept. 28	Sept. 2	July 9	Feb. 28	Jan. 25
Oct. 3	Sept. 7	July 14	March 5	Jan. 30
Oct. 8	Sept. 12	July 19	March 10	Feb. 4
Oct. 13	Sept. 17	July 24	March 15	Feb. 9
Oct. 18	Sept. 22	July 29	March 20	Feb. 14
Oct. 23	Sept. 27	Aug. 3	March 25	Feb. 19
Oct. 28	Oct. 2	Aug. 8	March 30	Feb. 24
Nov. 2	Oct. 7	Aug. 13	April 4	March 1
Nov. 7	Oct. 12	Aug. 18	April 9	March 6
Nov. 12	Oct. 17	Aug. 23	April 14	March 11
Nov. 17	Oct. 22	Aug. 28	April 19	March 16
Nov. 22	Oct. 27	Sept. 2	April 24	March 21
Nov. 27	Nov. 1	Sept. 7	April 29	March 26
Dec. 2	Nov. 6	Sept. 12	May 4	March 31
Dec. 7	Nov. 11	Sept. 17	May 9	April 5
Dec. 12	Nov. 16	Sept. 22	May 14	April 10
Dec. 17	Nov. 21	Sept. 27	May 19	April 15
Dec. 22	Nov. 26	Oct. 2	May 24	April 20
Dec. 27	Dec. 1	Oct. 7	May 29	April 25
Dec. 31	Dec. 5	Oct. 12	June 2	April 30

Brewing. Cleanliness and care are the principal things to be observed in brewing. It consists of five operations, namely: mashing, boiling, cooling, fermenting and cleaning. The first process is simply to obtain an infusion of the malt. In the second this infusion is further impregnated with the flavor of the hops in boiling, which is necessary for preserving the beer. In the third the decoction is cooled to the requisite temperature for fermentation, and is excited with yeast, filling it with carbonic gas, giving to the liquor that lively and pungent taste for which it is esteemed.

The utensils necessary for brewing on a small scale (say for a hogshead, or fifty-four gallons of beer), will consist of a copper containing seventy gallons, a mash tub with a false bottom about three inches above the other bottom, bored full of small holes to prevent the malt stopping up the hole of the faucet. For the sake of economy two pieces of wood can be nailed together, bored full of holes and fitted to the side of the tub so as to cover the hole of the faucet. This is to prevent the malt or grain from flowing out with the wort, which would spoil its transparency. The tub should hold ten or twelve bushels of malt, with plenty of room for mashing or stirring. An underback to receive the wort from the mash tub, an oar or rudder to stir up the malt in the mash tub, and two or three coolers should be provided. The latter must be broad and flat that the wort may cool quickly; for if the wort is too long cooling it is likely to become sour in the coolers. These should be raised at one end, that the wort may run off at the lower end without being disturbed or shaken, and also that the sediment that falls down may not again be mixed with the wort. Further, there must be a fermenting tun, the mash-tub, when emptied of grain, also serving this purpose, casks, and oak stands for the casks and tubs to be placed on. These articles must be of proportionate size with the copper.

The object of mashing is to convert into sugar as much as possible of the flour of malt, so that the extract drawn from it may contain the greatest amount of saccharine matter it is capable of giving. To do this perfectly, care must be taken as to the heat of the water used in mashing, whether hard or soft, or of good quality, the perfect mixing of malt with water, and the time of their remaining together.

High-dried malt does not produce as much saccharine matter as pale malt. The goodness, flavor and clearness of the extract depends on the temperature of the liquor used. When near the boiling point the flour of the malt will be set, forming a kind of paste or starch, and the extract obtained will be little better than water. If the temperature be too low the wort will be poor and devoid of strength. For pale malt the heat of the water must be higher than for the brown. Thus for the pale malt the heat of the water for the first mash should be 178° Fahr.; for the second, 182°. Pale and amber mixed, or pale malt approaching amber, 172° for the first mash; second, 178°. All amber, first, 170°; second, 176°. For very brown, or brown malt, such as is used for porter, 154° for the first; second, 164°. When hard water is used the heat in each case should be about 2° less. An equal portion of pale amber and brown, or half pale and half brown, first, 160°; second, 166°. The time for the standing of the mash is from an hour and a half to two hours. Heat the water in the copper to the required degree by Fahrenheit's thermometer. In reducing the heat in the copper add cold liquor, but be careful to stir the hot and cold well together, and mix. Stir in the malt gradually, and mix thoroughly by means of the oar, and leave no lumps or clots. The remainder of the liquor may be added by degrees, as the mash becomes too stiff to stir, until the whole is used. Reserve about one-half bushel of the malt to throw over the top when the mashing is finished. Cover the tub with malt sacks or cloths to keep in the heat, and let it stand the required time. Turn the tap partially, to allow the wort to run off slowly, and draw off some in a pail or bucket. The first running will not be clear, and the liquor should be turned carefully back into the tub. Repeated trials should be made until it runs clear, then draw off into the underback. As the wort runs out more slowly the tap should be opened wider, until the whole has run out, and the bed of the grain looks dry; then turn the tap to prevent any more running off. While the mash is standing, heat water for the second mash; this should be ready by the time the first wort is drawn off; then with a bowl or ladle pour over the grains, gently, about half as much water as for the first; cover the tub; let it remain ten minutes, and draw off as before. The wort from the first is always the best. The proportion of wort to be obtained from each bushel of malt depends entirely on the proposed strength of the liquor required. To ale or beer of a superior kind the produce of the first mashing only should be used. For ordinary drinking ale, take the produce of the first and second mashings; mix them well, and ascertain the gravity by a saccharometer, if you have one.

As soon as the water is taken from the boiler for table beer, damp the fire and put in the wort. For every bushel of malt used, allow one pound of hops previously soaked in water taken from the first mash at 160° of heat. Add half the hops at first, and the other half after the wort has boiled half an hour. Two pounds of hops by this method are considered equal to three pounds used in the ordinary way. The water in which they are steeped is strained off and put into the tub, instead of the copper, which preserves the flavor of the hops. Boil the wort as quickly as possible. Try it occasionally in a glass to see if it has separated into large flakes; if it has not, boil a little longer; when nearly ready it will appear broken into fine particles. The extremes of under and over boiling must be avoided.

In drawing off into the coolers the hops should be well stirred to prevent their being burned on the bottom. Strain through a hair sieve to extract the hops. The coolers should be as shallow as possible, that the wort may not be too long in cooling. When the first wort is drawn off, return the hops again into the boiler, with the wort for the table beer, and let it boil quickly for one hour and a half. When the wort has been cooled down to 75° or 80°, draw it off into the fermenting tub without disturbing the sediment at the bottom, for that gives the ale or beer a disagreeable taste.

To ferment, it will require about three pints of good white, fresh yeast to work a hogshead of beer. Mix the yeast with a gallon or two of the wort, and a handful or two of bean or wheat flour, in the fermenting tub. As soon as the wort is at the proper degree of temperature run it into the tub, reserving out some of the ferment to feed the beer as occasion may require. When it becomes languid, or there is sufficient yeast in it, it can be left out altogether. The fermentation should be gradual at first, for if it goes on too quickly the beer is liable to become "foxed," that is, have a rank and disagreeable taste. The next morning the beer should have a thin, white, creamy head; then with a bowl or ladle rouse it and mix it well together. If the fermentation has not been favorable, add some of the ferment; and if rather cold, wrap some sacks or old carpet round the tub and place a covering on the top; also keep the doors and windows closed, and let the fermentation go on till it is sufficient.

To cleanse beer or ale the yeast should be skimmed from the top, and the liquor drawn off gently, so as not to disturb the bottom. The casks should be plugged a little on one side, that the yeast may work and discharge itself at the bunghole. A tub or pan must be placed underneath to receive the yeast as it works over. The greatest attention should be paid to filling up the casks with the wort that is left, which should be done every half-hour at first, and as the working becomes slow, every three or four hours, that the yeast may continue to discharge itself. When the yeast has ceased to discharge itself, plug the casks upright, mix a round of the best hops with the best old ale or beer, and scald them over the fire. Mix it well into the cask by means of a long stick and bung the cask close; make a spile hole near the bung, and put in a spile, rather loosely at first, and after two or three days knock it in firmly.

Brewis, bread soaked in gravy, or prepared in water and butter. See Bread, page 109.

Brick. The best brick and fire clay is free from stones and gravel, and when cut with a knife it presents a uniform, greasy-looking surface, free from the appearance of coarse sand. When it is bruised in a mortar and mixed with water, and the water, after remaining in the mortar five minutes, is poured off with the finely divided matters suspended in it, and the washing is repeated so long as the water, after five minutes of rest, carries away any suspended matter, there should remain in the mortar not more than 5 or 10 per cent. of sand. The greater the proportion of alumina in the clay the more plastic it is, and the "fatter" it is; it is more tenacious than "poor" clay. The coloring matter of the common clays is due to oxyd of iron, a little oxyd rendering it yellow, and more of the oxy making it red, or reddish. The alumina or silica of the clay are infusible; the fluxes are, oxyd of iron, lime, magnesia, potash, and soda. The more flux and sand there is in the clay, the more will it fuse and vitrify. that is, glaze, or become glass; therefore, too much of both these classes of elements should not be in the clay at the same time. When there is lime present, forming nodules, the clay should be screened, and this should be done before it is "puddled.'' When rich clays dry slowly and crack in the kiln, they may advantageously be mixed with a portion of fine silicious sand. The tenacity of clays containing coarse gravel or stones may be increased by screening or washing, so as to separate the clay from sand and stones. When clays run in the kiln, the defect may be corrected by adding to them some silicious sand. When rich clays are found costly to burn, the expense of fuel may be lessened by a proper addition of chalk or lime.

A good brick machine can now-a-days be obtained for $40, and most farmers can find time in August and September to make a lot of brick, which will be sure to net them some money. A machine will last several years. (See Tile and Brick Machine.) Experiment a little with the clay to see that all is right, and if not, make it so by the addition of sand, clay, or lime, as indicated above. As the brick are taken from the machine, pile them up in a smooth yard as openly as possible, and under a shed to dry. They should also be screened from the wind, as too great exposure to it will crack and warp the brick. The burning and cooling must be done with a great deal of care, commencing with a moderate fire for a day or two, to expel the remaining moisture; when there appears no longer any whiteness in the smoke, the moisture is all out, and the fire may be increased until the arches attain a white heat. Then allow the fire to abate in some degree, to prevent vitrification; it is alternately raised and lowered until the brick are sufficiently burned, which will be in six or seven days. The exact point of burning can be ascertained at the top of the kiln. The cooling should be slowly effected, by closing the arches and sides and the top of the kiln with moist clay, and letting it remain until cool. The manner of piling up the brick in a kiln can be best learned by visiting some good brick yard. A kiln 13 feet long, 10 feet 6 inches wide, and 12 feet high, the walls being perpendicular on the inside and piled full, deducting the arch openings, will contain about 25,000 brick.

Good brick exhibits a fine, compact, uniform texture when broken across, gives a clear, ringing sound when struck, and is of a cherry-red or brownish color. Three varieties are found in the kiln: arch brick, which are more or less vitrified, being glassy at one end. They are very hard, but brittle and of inferior strength, and set badly with mortar. They are good for walling wells. Those from the interior of the kiln, usually called "red" or "hard" brick, are of the best quality. Those from near the top and sides, which are generally under-burnt, are called "salmon" brick; they are too soft for outside work, but are good, when pounded up, to make filters.

Brick-work is generally measured by the thousand, sometimes by the cubic yard or foot, including labor, mortar and scaffolding. In measuring walls faced with stock or pressed brick, take the area of such facing as for common work, and add eight inches in breadth and four inches in height on each opening, and four inches at each corner for the workmanship only, and deduct the openings. In many sections, however, it is customary to measure one-half of all openings five feet or less in width. A superficial foot of facing fronts will take seven and a half bricks to the square foot. In measuring for the length of partition walls, take the dimensions clear of the outside walls, no deductions to be made for plates and bond timbers, sills, lintels, etc., but two inches in height to be allowed for bedding plates where no brick work is over them. In plain wall just 17 times as many brick will be required to the foot as there are inches in the thickness of the wall. Chimneys are measured solid, to allow for the trouble of forming and plastering the flues. In chimney breasts, take the width of the face on each floor, and multiply by the height and by the thickness projecting into the room, the fire-places not deducted. In chimney tops, take the width and multiply it by the height above the roof, and by the thickness or number of bricks thick. When projections on the top exceed two courses of brick, two courses are to be added to the height. All chimney stacks, whether of square, circular or octagon shafts, are measured solid.

Five courses of brick will lay one foot in height on a chimney; six bricks in a course will lay a flue four inches wide and 12 inches long, or a flue eight inches square; and eight bricks in a course, a flue eight inches wide and 16 inches long.

A cubic foot of brick-work weighs from 100 to 125 pounds. A 9-inch wall requires 15 bricks, and a 13-inch wall 22½ bricks. One bushel of hydraulic cement will, where mixed with two bushels of cheap sand, serve to lay 150 bricks. Mortar, when made up, should not be disturbed for several days, and during the period of its consumption should be broken down and "tempered" in no larger quantities than may be required for use from day to day.

Brick Earth, any stiff clay containing 50 to 70 per cent. of real clay and the rest sand.

Brick Ovens, HOW TO MAKE. A good brick oven separate from the dwelling is worth more than all the stoves and ranges that one could store in his kitchen. In such an oven everything will be baked just right, and free from danger. In its construction, lay the foundation as a simple pavement, until of proper height, and on this lay two courses of hard brick for the bottom of the oven; then build the mouth and part of the sides, until it is high enough to draw the sides inward; then sand or mellow earth may be placed on the foundation, and the surface smoothed off and pressed down to the desired form of the oven; then let the brick-work be built over this form of sand; let two courses of hard brick be laid over the form with the best mortar; and after the last brick is laid, the sand may be removed. The brick should be soaked for several hours previous to being laid, so that it will not absorb the moisture until it has set. A smoke-stack a few feet high at one end of the furnace will finish the structure. In using such an oven, heat it all through for several hours before placing in it the article to be baked, and then withdraw the fire, as the baking is commenced.

Brick, RED WASH FOR. To remove the green that gathers on bricks, pour over it boiling water in which any vegetables, not greasy, have been boiled: do this for a few days, and the moss will disappear. For the red wash, melt 1 ounce of glue in a gallon of water; while hot, put in a piece of alum the size of an egg, ½ pound of Venetian red and 1 pound of Spanish brown. Try a little on the brick, let it dry, and if too light, add more red and brown, and if too dark add more water.

Bridges. As road and bridge overseers are often incompetent or derelict, we take the opportunity here to offer a few suggestions, which may do some good. Such officers are responsible to the township or county, and the township or county is responsible to any party injured by the carelessness of the officers.

As wooden bridges are fast being replaced by iron structures, it becomes a matter of some importance, financially as well as for safety, that only first-class bridges are built. Too often, on country roads and in smaller towns, this is not the case, and taxpayers will find to their sorrow before many years have elapsed that they have been most shamefully swindled. A bridge should be capable of sustaining a load of about 65 lbs. per square foot of floor surface, over the whole or any part of the same, or should pass a log cart carrying 15,000 lbs. on two wheels, in addition to the weight of the bridge, without straining any piece to exceed 10,000 lbs. per square inch, or one-fifth of its ultimate strength, and when fully loaded the bridge should not deflect more than 1-1200 of its length, and when the load is removed should return to its original camber.

No bridge should be planned except by a competent engineer, and the execution of the plan should be under his immediate supervision, or, at least, under the supervision of a responsible mechanic. For large structures, there are competent bridge manufacturers, builders and contractors, who exclusively follow their respective lines of business; but responsible parties will scarcely ever put in a bid at a bridge-letting where they see that the commissioner is likely to let the contract to the lowest bidder irrespective of quality of work. Small wooden bridges are easily planned, but large iron ones should have no guess work in their designs.

In bridging a stream, care should be exercised not to narrow the channel, but rather widen it a little, that the water of freshets do not become dammed up and carry away the bridge. Also the abutments should be laid deeper than they generally are. Stone abutments, especially, require a solid foundation. In laying plank upon a bridge, a common error is to use wide oak plank, which, when exposed to the weather, will invariably warp, draw out their spikes, get loose, and so become an intolerable source of danger and vexation. Oak plank is probably the best flooring for bridges, but it should be in narrow strips and firmly spiked or bolted down.

Another very common failure is in the narrow, unwalled or unprotected approaches to the bridge. The embankments soon wash down and become as great a nuisance as the slovenly made bridge itself. It is next to impossible to make a narrow embankment safe, especially if it has steep sides. The embankment should be wide, and its sides sloping enough for the formation of a good turf by grass, willow, etc., upon its sides. Nor should approaches be so steep as they often are, as they make teaming up their declivity unnecessarily hard, and down it extremely hazardous.

Bridle. An apparatus of straps of leather and pieces of metal for keeping a horse in subjection and controlling his motion. The several parts of a bridle, as they are generally made, are the bit; the headstall, or leather piece from the top of the head to the rings of the bit; the fillet, over the forehead and under the foretop; the throat-latch, buckling from the head-band under the throat; the nose-bands, going through the loops at the back of the headstall, and buckled under the cheeks; and the reins, attached to the rings of the bit. To some bridles are attached blinds or blinkers. These are leather plates permanently fixed to the sides of the bridle, and so adjusted as to prevent the horse from seeing objects on either side without obstructing his vision in front.

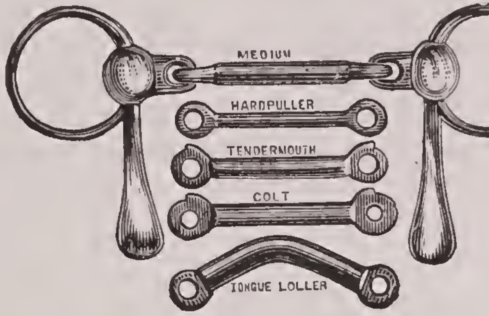


Fig. 1.—*The Doughty Magic Bits.*

Bits. The essential part of the bridle is the bit, which is of different shapes and with various attachments, according to the purposes intended. The "gag-bit" has a semi-circular curve in the middle, for the purpose of giving better control over a "hard-mouthed" or unmanageable animal. Fig. 1 represents a new style of bits (five examples, all on the same principle), which is represented to work wonders in giving a rider or driver control of vicious horses. The "World's Wonder Bridle-Bit," represented by Fig. 2, is constructed on humane principles. It is claimed for it that it stops side-pullers, cures vicious pullers, toughens tender mouths, prevents lolling of the tongue, and does not press the lips against the teeth.

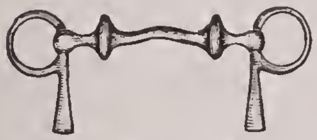


Fig. 2.—*World's Wonder Bridle-Bit.*

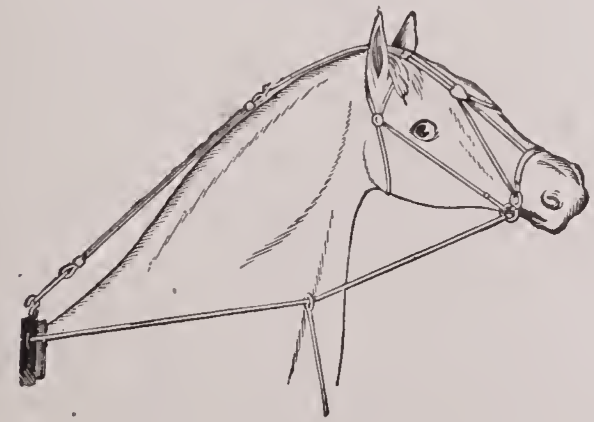


Fig. 3.—*Upper-Jaw Check.*.

Check Rein. Fig. 3 represents Sherman's upper-jaw check rein, a late invention for the natural, graceful and easy carriage of the horse's head, and comfort and pleasure of the driver. It holds the check bit to the upper-jaw so that it does not come in contact with the driving bit, does not in the least cramp the muscles of the neck or the windpipe, and is somewhat ornamental as a part of the outfit.

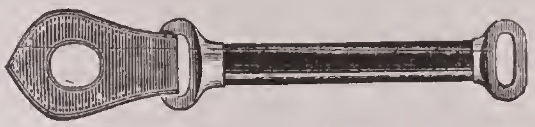


Fig. 4.—*Emmert's Check Ease.*

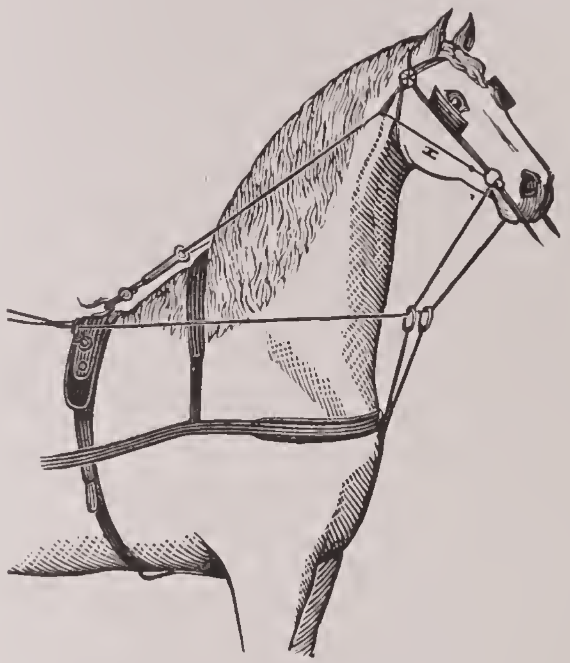


Fig. 5.—*Side Check.*

Check Ease. Figs. 4, 5 and 6 illustrate the form and use of Emmert's spiral-spring, cylinder-tube check ease. It can be attached to any style of check rein, over check, side check, double or single. It is ornamental, durable and humane. The spiral spring yields to the motion of the horse's head, thereby preventing sore mouth, sore

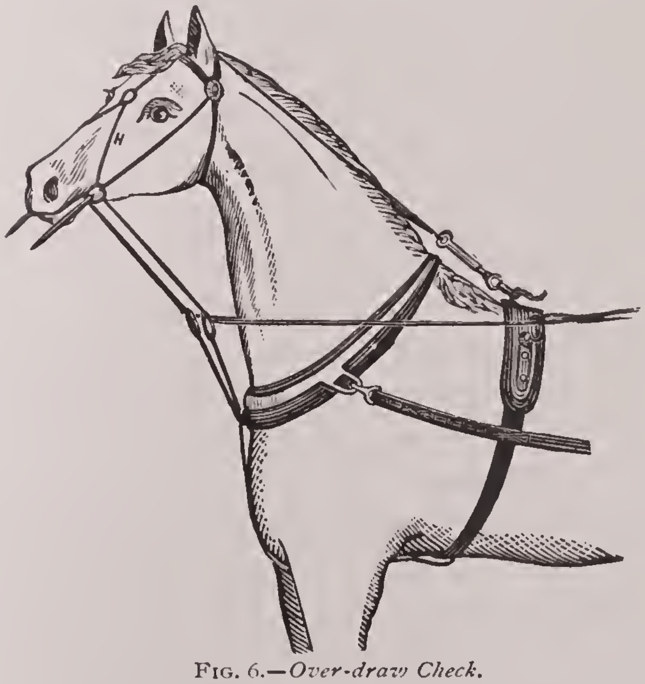


Fig. 6.—*Over-draw Check.*

tails and sore backs, enabling him to move freely, and consequently trot faster. They save, in case of stumbling, breaking the check rein, check hook or back strap.

They are a neat tube within a tube, containing a steel spiral spring, two eyes (i, i), one for the check to pass through, the other for the leather (k) that attaches to the check hook. This device is three and one-half inches long; will expand and contract two inches; is durable and ornamental. They are good for breaking colts, as they give with the motion of the head, preventing the neck becoming tired and bearing down or lugging on the bit, invariably giving a sore mouth and bad habits that will last through life. It also prevents sore backs by expanding with the motion of the horse's head, thereby preventing the rocking motion of the back-saddle which we get from an ordinary check, and which causes sore backs in hot weather. It also prevents sore tails, by expanding and taking the strain off the back-strap. Horses can trot faster and steadier than it is possible for them to do without it.

After all, viewed from the standpoint of humanity, the check rein is a relic of barbarism. It holds the horse's head in a stiff, constrained position, spoiling all chance for fine driving. A simple bridle rein which does not pass through the loops of the throat lash is better, though with a horse of any natural spirit neither is necessary.

The riding bridle should be of white or russet leather, of good quality, and it will be more satisfactory if its buckles are of polished steel or nickel and detachable (that they may be easily cleaned), rather than covered with leather and sewed fast to the bridle. Covered buckles are usually so weak as to easily get out of order. The bridle should be, for elegance, as plain as possible, and it may have either single or double head-straps according to the sort of bit which has to be used.

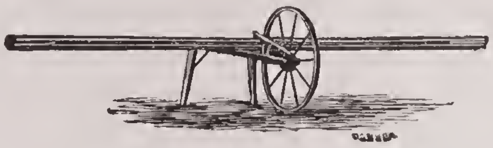
Bridle, OF A PLOW-BEAM, is the iron on the fore end which holds the clevis.

Bright's Disease: see Kidneys.

Brining Grain, the practice of steeping it in pickle (the strongest brine), in order to prevent smut and other diseases.

Britannia Metal, an alloy of equal parts of tin, plate brass, bismuth and antimony. So far, therefore, as it oxidizes it yields a substance that is poisonous. To clean Britannia ware, first wash it with a woolen cloth and sweet oil, then in suds, and lastly with soft leather and whiting. Or, first wash with hot suds, then rub with a mixture of rotten stone (powdered very fine and sifted), soft soap and turpentine, of the consistency of stiff putty; finally, rub off briskly with a dry, clean rag or leather.

Broadcast Sowing, the scattering of seed upon the surface of the ground. This is generally done by hand, but several little machines have been invented to do the work more perfectly, one of which is represented by the annexed engraving. It is the "Michigan Wheelbarrow Seeder," made by M. Gibbs, Homer, Mich.



Wheelbarrow Seeder.

This seeder, it is claimed, relieves the farmer of much of the trouble attending the seeding of land with clover or grass seed. But few men can sow clover or timothy seed by hand, even on a still day; but a common laborer can do the work with this machine. It will sow as well on a windy day as on a still day, and any amount per acre from two to twelve quarts. It will sow clover or timothy seed, mixed or separate. The seeder has an index, by which the machine can be set for any amount per acre desired. It consists of a light hopper, 14 feet long, mounted on a wheel-barrow, made as light as possible, consistent with strength and durability.

Broadcast sowing will be practiced "as long as the world stands." The seed thus sown is either brushed or harrowed in, or left to take care of itself, according to circumstances. Grass seed sown just before a rain does not require harrowing in; the larger seed do require it. To sow evenly by hand requires some practice and skill, and windy days interfere with even the most skilled work. It is an old adage that "whatever should be done at all should be done well;" but it always depends upon circumstances how much pains should be taken with a given task.

Brocade (bro-cade'), silk stuff, variegated with gold and silver, or raised and enriched with flowers, foliage and other ornaments. Also applied to other stuffs wrought and enriched in like manner.

Broccoli (brock'o-ly), almost exactly like the cauliflower, only it is more generally planted late, for winter use. Cultivation the same. The best varieties are Walcheren White, Large White Early French, Knight's Protecting, which is dwarf, very hardy, with very large heads, Purple Cape, Early Purple, Elletson's Mammoth, Carter's Summer and Southampton.

Brogan (bro'gan or bro-gan'), a stout, coarse shoe.

Broken-backed HORSE, one having his spinal ligaments hardened into bone.

Broken Wind, a disease of horses, affecting the lungs and air passages. It is often accompanied with enlargement of the lungs and heart, which disables the animal from bearing fatigue.

Brome Grass, cheat or chess, and one or two other kindred species.

Bronchitis (brong-ki′tis), a disease affecting the respiratory organs, generally accompanied with a cough, and is very difficult to cure. Avoid exposure to cold or damp air, and refrain from reading aloud, public speaking, singing, or blowing instruments; keep clear of stimulants, and use a diet of milk and vegetables; take some soothing sirup to allay the irritation; wear no cravat or other bandage about the neck—a light ribbon is sufficient; let the neck have plenty of fresh air, and apply cold water to it every morning when you wash.

Bronzed articles should be oiled and wiped with a cloth every day or two, to keep them bright.

Broom, besides being the name of several plants, is the name also of a well-known household necessity. Good brooms are furnished by the regular manufacturers so cheaply at the present day that no farmer cares to make them. If brooms are wetted in boiling suds once a week, they will become very tough, will not cut a carpet, will last much longer, and always sweep like a "new broom."

Broom-Corn. The raising of broom-corn is a prominent industry in the West, the soil being particularly adapted to it. It is doubtful whether it will ever be superseded as a material for brooms. In its early growth and general appearance it resembles Indian corn. It stands upright to a height of eight feet or more, with a stalk of nearly uniform size its entire length, from which an occasional leaf appears; and at the top a long, compact bunch of slender, graceful stems is thrown out, familiarly termed "the brush," which bears the seed. There is a dwarf variety latterly introduced.

Any soil that will grow Indian corn will produce broom-corn. It should be rich, warm land, and not subject to unseasonable frosts. Spring frosts injure broom-corn more than maize, as the roots do not strike so deep; nor has it the power to recover from the effects of frost equal to the latter. Clay lands are not suitable for this crop. It, like corn, can be grown on the same soil for years in succession, but rotation is better. Excellent crops are usually raised on a green-sward, turned over as late as possible in the fall, so as to kill the worms. Barn-yard, hog-pen and sheep manure, well rotted, are good for broom-corn. If the land is in good condition, three cords, or eight loads, is sufficient. The manure is usually placed in the hills or in drills. Land plaster, lime and ashes, separately, or mixed, are often used. Any fertilizer that promotes the growth of corn is good for broom-corn. Poudrette, at the rate of a gill in each hill, if the African, or two-thirds the quantity if the Peruvian is used, mixed into a compost with ten times its quantity of good soil, is an excellent application, especially if the land is not in good heart. To repeat either of the latter around the hill after each hoeing or cultivating will hasten the maturity of the crop.

Broom-corn is planted in both hills and drills. If in hills it should be three feet between the hills and four feet between the rows; if in drills, three feet and a half, north and south, that the sun may shine alike on all the plants. If the seed is good 12 or 15 seeds should be placed in a hill. Sown in drills, the seeds should be dropped two inches apart, or three to ten are dropped at intervals of 15 to 18 inches. Fine, thick, tough brush is the result of thick planting, but if the plants are too close the stalks will be unprofitably slender. The seed should be covered from three-fourths to one and one-half inches deep. Plant as early as possible and at the same time escape the spring frosts.

As soon as the plants are visible run a cultivator between the rows, and if the soil is full of weeds, follow with a hoe. If the crop is kept clean until it gets a good start, in the West, where there are no obstructions, and the farmer has a modern cultivator, the weeds can easily be kept down without resort to the hoe. Where the plants are in hills they should be check-rowed so as to admit the cultivator both ways. At the first cultivating or hoeing, thin out the plants to two or three inches apart in the drills, or five or six plants to the hill.

Lopping the brush or breaking the tops becomes necessary when standard varieties are grown, and when the season is liable to be too short for the corn to mature. This consists in going through the field and bending each top at a point 12 to 18 inches below the brush, allowing the latter to hang down against the stalk. Lopping hastens the ripening, and protects the brush from injury by rain. It also secures straight brush, which is an important item.

Tabling consists in breaking down the stalks of two rows, so they will cross each other diagonally. The bend is usually made about two and a half feet from the ground. Cutting may be done without tabling if the brush can be reached. The time to cut is when the blossoms begin to fall. Cut off not more than eight inches from the brush, using a knife. Place in convenient bundles, and then take to the barn or shed for curing. The stalks remaining on the ground may be cut close, or pulled up and buried in the furrows for manure, or burned, and thus be restored to the earth to enrich it; or they may be carried to the barnyard to mix in a compost, or with the droppings of the cattle.

Broom-corn should be cured under cover, for exposure makes it brittle. A roof and free circulation of air is all that is necessary. The brush is cleaned by hand, by passing it through a kind of hatchel, made by setting upright knives near enough together, or it may be cleaned by a long-toothed curry-comb. In the first method none of the little branches are broken, and the brush makes a finer and better broom. Horse-power machines are frequently used for cleaning seed, which they do with great rapidity. The average yield is about 500 pounds of brush to the acre. It varies according to the season and soil, from 300 to 1,000 pounds. The price also varies materially, depending on the extent of the crop and the demand. When well matured the seed will average three to five pounds to every pound of the brush.

Assorting the brush is merely keeping the crooked and otherwise defective heads from the straight and perfect. This may be done in the field, at the time of hatcheling, or after curing. But it must be done, and the two qualities must be kept separate.

Prices obtained for broom-corn depend much on the appearance of the bale. The usual size of the bale is: Length, 3 feet 10 inches; width, 2 feet, and height, 2½ feet. They weigh from 150 to 450 pounds, according to weight applied in pressing. The hay, cotton, or hop press can be used, or the farmer can devise one himself. No. 9 fence wire is generally used for binding. Each bale should be made true and even at the ends. Bale the crooked brush by itself, and sell it for second quality.

The uses of broom-corn are limited to the manufacture of brooms from the brush, and the consumption of the seed when grown and mixed with other grain, in feeding to fattening or working cattle, sheep and swine, and occasionally to horses. Brooms manufactured from it have superseded every other kind for general use in the United States, and within a few years they have become an article of extensive export to England and other countries. The brush, and wood for the handles, are imported by foreign dealers, to avoid the payment of duties, and then put together. The cultivation of broom-corn was once almost exclusively confined to the Eastern States, but it is now largely raised in the corn-growing regions of the Northwest.

When it is desired to grow broom-corn on a large scale, some capital must be invested, and special preparation for curing, etc., must be made. A revolving scraper must be provided, with horse, water, and steam-power to run it. This machine is sometimes made with two cylinders revolving in opposite directions. A box made in the form of a saw-buck, with the sides and one end boarded up, should stand where the operator can deposit the brush as it is cleaned. From this box it is bound and taken to the dry house. The dry house is usually built for the purpose, though a tobacco house may serve. For 50 acres a building 20 by 40 feet, 16 feet high, with a shed at one side 10 feet wide and 8 feet high, will be required. Put on a shingle roof, and cover the sides with boards, battened. Hang every fifth board on hinges, with a button fastener, that they may be opened to admit the air, and be securely closed during storms.

Drying-racks must be provided by taking two poles or light scantlings, 12 feet long; to these nail narrow strips or laths six inches apart. Fasten at top and bottom the length of a lath apart, if laths are to be used. Lay other laths across the strips, and place upon them the brush, not more than two or three inches thick. Here it remains until thoroughly dry. Give it all the air possible, and the least amount of dampness. Make as many racks as your building will accommodate.

It is said that broom-corn seed makes very fair breadstuff, especially palatable to some people.

Brougham (broo′am or broom), a kind of carriage, two or four-wheeled, to carry two or four persons.

Brown, a dusty, dark brick color, like that of dead foliage. In all species of domestic animals, some individuals are found of this color, and a large portion have the legs, feet, tail, neck, head, or back of some shade of brown. It is not a beautiful color to have prevailing on all parts of any individual, and should be therefore avoided by the management of breeding. The most beautiful brown horses are those which are also finely dappled.

To "brown" an article of food for the table is to bake it until it is slightly scorched, or brown, over the surface, as potatoes, parsnips, etc.

Brown Stout, strong, brown beer, brewed from high-dried malt.

Browse, to eat or nibble off, as the ends of branches of trees, shrubs, etc., by cattle or deer; to feed upon twigs, scattering grass, etc.; also, the food thus eaten.

Bruise. It is amusing to see how many salves and poultices, ointments and liniments, compounds and compositions, decoctions and infusions, embrocations and macerations are recommended for bruises, when the common bread-and-milk poultice is always as good as any or all of them.

Brushes. At the present day brushes are manufactured for every specific purpose, and are made of bristles, hair, feathers, broom-corn, grass, wire, wood, etc. Broom brushes for clothing are called "whisks," though this latter term literally includes a variety of brushes. Hair brushes should be cleaned with an ammonia solution, and not soap, and dried in the sun. Do not expose the mahoganized or other delicately finished wooden back of the brush to the solution. Feather brushes for greasing pans and brushing eggs over tarts and pastry are made by boiling the wing feathers of a turkey or chicken for five or ten minutes, rinsing them in tepid water, drying, and tying up in bunches.

Brush-wheel, one which is turned by the surface of another wheel, without cogs or bands.

Brussels Sprouts, a garden vegetable of the cabbage family, having small heads crowded along a tall stem. It grows from two to four feet high, and is cultivated like cabbage. Where winter is not very severe, the plants can be left out, and sprouts gathered as wanted for the table; otherwise, store as cabbage. The cooking, of course, is also the same as for that vegetable. The best varieties are Dwarf Improved, Dalmeny Sprouts, a hybrid between Drum-head Savoy and Brussels Sprouts, and Scrymger's Giant Dwarf, a new variety with a close and compact head.

Buck, to rear and plunge, in order to throw off the rider: said of horses.

Buck-bean, a bitter, three-leaved herb, growing in swamps. The leaves are sometimes used as hops, and medicinally they are a tonic. Abundant as far west as Lake Michigan.

Buck-thorn, a thorny shrub, sometimes grown as a hedge. The berries are cathartic and griping.

Buckwheat. This is the only cultivated "grain" which does not belong to the grass family of plants. It belongs to the order of knot-weeds and "goose-grass." It is one of the honey plants, growing freely on light soils, but yielding a remunerative crop only on those which are fertile. Sandy loams are its favorite soils, especially such as have been long in pasture; and these should be well plowed and harrowed. Fresh manure is injurious to buckwheat. It may be sown from May 1 to August 10, but always early enough to ripen before frost. It is sown broadcast, at the rate of two to four pecks to the acre, and harvested when the earliest seed is fully ripe. It often continues to flower after this, but when, as is sometimes the case, the early seed is blighted, the crop may be permitted to remain until the later yield of grain is ripe. As it is liable to heat, it should, after cutting, be put into little stooks about two feet high over the field, and as soon as dry, taken in and threshed out. The straw will be eaten with avidity by sheep and young horses. A serious objection to the raising of buckwheat is its tendency to take possession of the soil as a weed.

Buckwheat Cakes. One quart buckwheat flour, four tablespoonfuls yeast, one teaspoonful salt, one handful Indian meal, two tablespoonfuls molasses (not sirup), warm water enough to make a thin batter; beat very well and set to rise in a warm place; if the batter is in the least sour in the morning, stir in a very little soda dissolved in hot water; mix in an earthen crock, and leave some in the bottom each morning—a cupful or so—to serve as sponge for the next night, instead of getting fresh yeast; in cold weather this plan can be successfully pursued for a week or ten days without setting a new supply; add the usual quantity of flour, etc., every night, and beat up well; do not make the cakes too small; they should be of generous size. Some put two-thirds buckwheat and one-third oatmeal, omitting the corn meal.

BUCKWHEAT SHORT-CAKE. Take three or four cups of nice sour milk, one teaspoon of soda or saleratus dissolved in the milk; if the milk is very sour, you must use saleratus in proportion, with a little salt; mix up a dough with buckwheat flour, *thicker* than you would mix the same for griddle-cakes, say quite stiff; put into a buttered tin, and put directly into the stove oven and bake about thirty minutes, or as you would a short-cake from common flour. It takes the place of the griddle-cake, also of the short-cake, in every sense of the word; nice with meat, butter, honey, molasses, etc. No shortening is used, and no need of setting your dish of batter over night. Wet the top a little, and warm it up at next meal, if any is left; it is just as good as when first made, while griddle-cakes have to be thrown away. It is also very good cold.

Self-raising buckwheat flour is now furnished through the groceries, and the cakes from it are very palatable and rich; but, like all things compounded for the market, we should suspect dirt and adulteration, and do all our own compounding at home.

Buckwheat diet is suspected of producing an itch, sometimes called the "scratches;" but it is not yet determined how much of the disease may be due to the extraordinary amount of burnt grease and alkaline substances eaten in the buckwheat-cake season. For the treatment of this trouble, see Scratches.

Budding. This process of propagating a variety of fruit consists in the insertion of the bud of the variety to be propagated into a stock. There are various modes of performing the work, and however well they may be described in a book, it is advised that every beginner visit a good nurseryman or amateur fruit-grower in his neighborhood, and witness the operation. Both the stock and graft or bud should be in a healthy, vigorous state. The time for budding the several fruits is indicated under the headings of those fruits respectively.

Budding is real grafting, and differs from what is ordinarily called grafting only in that the bud is used instead of the twig. Cuttings of buds for budding may be made at any time when the tree has formed its terminal buds of growth for the year and the buds are ripe.

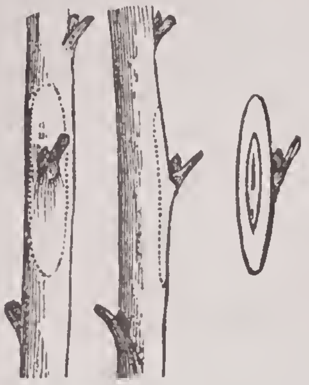


Fig. 1.

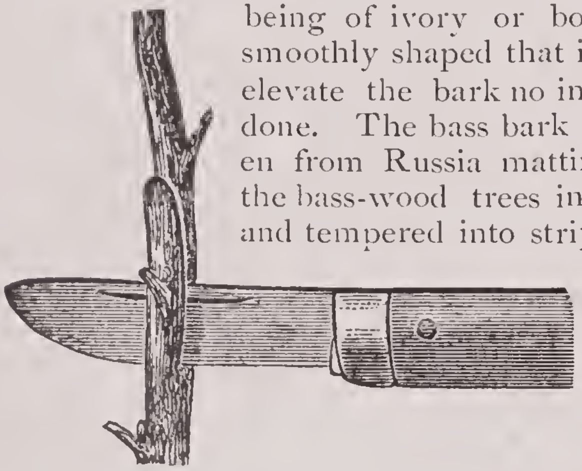


Fig. 2.

American shield budding requires that a piece of wood be left at the base of the bud, which is neatly cut into a kind of thin shaving so as to form a foot, as it were, to be inserted under the bark of the stock (Figs. 1 and 3). The bark on the north side of the stock is just cut through by the incision (Fig. 3); the first is horizontal from one-sixteenth to one-eight of an inch long, and the other perpendicularly down from that a half an inch or more, according to the size of the bud; the bud is then cut from its cion as before directed, and slipped in place and bound there with strips of bass bark. This work is generally performed with a budding knife, one end of the handle being of ivory or bone, and so smoothly shaped that in using it to elevate the bark no injury will be done. The bass bark may be taken from Russia matting, or from the bass-wood trees in the spring, and tempered into strips by keeping it in water for a time. In tying in the bud, commence at the lower end of the incision and wrap the strip of bark around and around upward until the bud is reached, where it is then tied (Fig. 4). The pressure should be just sufficient to keep the inserted portion closely to the stock but not such as to crush or bruise the bark. Woolen yarn, however, or soft strips of old cotton cloth can be used in place of the bark, but they are not quite so good. In about ten days or two weeks after insertion has been made, the strips or bandages will require to be loosened, and at the expiration of three weeks removed altogether.

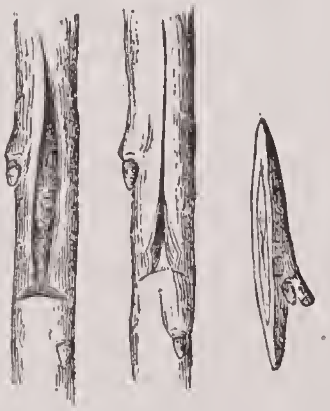


Fig. 3.

The ensuing spring, as soon as the buds begin to swell strongly, cut off the stock about six inches above the bud, and as the shoot of the bud grows, tie it with any soft material to the piece of the stock above its insertion until about midsummer, or when it has made two feet of growth, when the stock should be cut away above the bud. Never insert the buds in water. Cut away the leaf, to prevent too great evaporation, whereby its vitality would be exhausted or injured. Buds, having the leaf removed, may be kept fresh and full of vitality for a number of days, if placed in a cool room wrapped in damp moss or cloths. In sending them by mail or otherwise shipping them, they should have damp moss wrapped around them and be enveloped in oiled silk or linen.

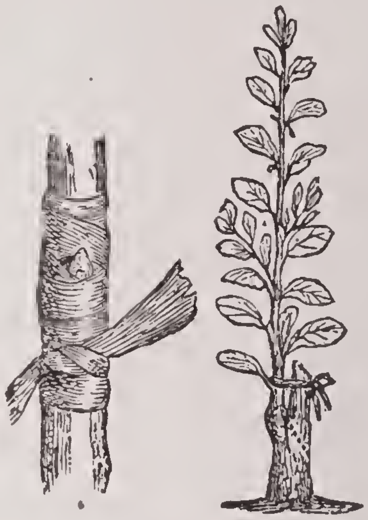


Fig. 4.

Annular or ring budding is another style adapted to hard-wood trees, but it is questionable whether it is as good as side grafting (see Grafting). In performing this a ring of bark is taken from a limb or stock, and one of corresponding size, containing the bud, is put in its place. Trees that have been girdled by mice or rabbits during the winter may be restored by the process of putting in live bark from a tree of its kind.

In all the processes of budding or grafting, especially if above ground, the wound should be covered with a grafting composition of some kind (for the best composition see Grafting); but a great many other mixtures are good, particularly if well put on. By using a greater proportion of tallow or lard, or less of rosin, the wax or taffy will be softer, and can be spread upon rags like butter, and these rags be used on the grafts with the greatest convenience.

Buffalo, the name of a wild animal, in Asia and Africa, of the ox genus, and, also, despite the dictionaries, the popular name of the American bison.

Bug, any beetle or beetle-like insect; more strictly, a fly which has the mouth parts in the form of a slender, horny beak, consisting of a horny sheath, containing three stiff and intensely sharp bristles, and whose wing covers are thick in their basal portion, and lying flat on the back, the thin portions crossing each other.

Buggy: see Carriage.

Buhr-Stone (bur'stōne), a flinty, quartzose, cellular stone used in grist mills. Most of these mill-stones come from Paris, but quarries of the same material are now discovered in several sections of the United States, especially in Georgia.

Buildings: see Residence, Barns, etc.

Bulb, a spheroidal body growing from a plant just above the roots and usually just below the surface of the ground, which is strictly a bud, its scales being large and fleshy. These scales, the second year, develop into stems and leaves. Lilies, tulips, onions, etc., are familiar examples.

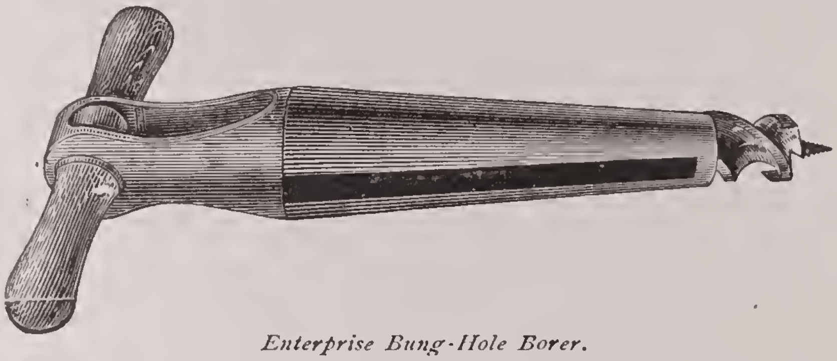
Bull, the male of the ox genus. The general structural characteristics of a good bull are common with those of any other neat cattle, with only the difference that the bull must possess all the admirable points in their fullest development, combined with the highest vigor of masculine qualities. The bull selected should, if possible, be pure in blood, of whatever breed may be adopted. He should be masculine in appearance, strong, vigorous, but not coarse. He should be fine in bone, his skin, and the flesh under it, elastic to the touch, with good, thick, woolly hair. The color should be true to its breed. His flesh should be well laid on in the best parts for beef, according to the models of the best breeds. He should be well fed and cared for, but should not be forced either to grow lean or fatten. It is bad to keep a bull half starved, and bad to keep one stuffed with food. He ought to grow up naturally, and be developed at the time and in the manner nature indicates. He should be used little for breeding till he is two years old; he then can safely serve from 50 to 80 cows during the season. If kept in the stable he should be led around the yard for exercise, each day. He should never be turned into the common pasture with the cows. During his first year a copper ring should be put in his nose, with which to master and lead him. He should be led by a light, strong stick, seven or eight feet long, with two links of a chain, and a snap at the end may be used in leading him. This method is much safer than to use a rope, the stick serving the purpose of a pike to fend off the animal in case he becomes infuriated. Sometimes a bull, usually kind and docile, will have a fit of frenzy, and if unprepared the keeper may be seriously injured or even killed; and such cases are not rare. Some bulls are made cross by violent treatment. From a calf the bull should be treated kindly, but always handled with a firm hand. If he is not cross, and is a good stock-getter, he may be kept until he begins to fail from age—at ten or twelve years old. When a bull is regularly serving many cows, the food should be increased. See also Cattle, and for castration see article Calves.

Bull, in commerce, the party who endeavors to raise prices. See Bear.

Bullion, uncoined gold or silver, in the mass.

Bull's Eye, besides denoting several things in nautical science, etc., is also the name of a policeman's lantern (or "dark" lantern), which emits light at only one side, through a glass of the shape of a bull's eye. Also, certain watches, from their general shape and appearance, have been denominated "bull's eye."

Bung-Hole Borer. This is a very convenient tool to have in the farm workshop. The one represented in this connection has some advantages over the ordinary ones. It has inserted in the end of the stock or reamer an auger or bit for boring the hole. It bores a complete round hole, regular taper, and holds its own chips, preventing them from entering the cask.



Enterprise Bung-Hole Borer.

Bunion. An inflamed and painful swelling of the sac containing the oil of the joint, chiefly situated on the outside of the great toe. This disease, if not remedied in time, is certain to lead to a permanent enlargement and disfigurement of the toe. The exciting cause is generally a long-continued pressure from a tight boot or shoe. Treatment: This should commence with a warm bran poultice, continued for one or two hours, so as to soften the cuticle of the part; a piece of lint, wetted in the extract of lead, is then to be applied, cold, round the toe, and the lint moistened from time to time with more of the extract. In a few hours all inflammation will have subsided, and if care be taken not to repeat the pressure, but use a large boot, the bunion will be cured. Or, treat as for corns. The cure will be more tedious.

Buns, very light, small, sweet cakes. To make them, take one quart of flour, one pint of warm milk, two ounces of butter and a gill of yeast; mix these and set it to rise three or four hours. Then beat up two eggs, one-fourth pound sugar and a few currants; mix this into the dough, and set it to rise again two hours. When very light, make the dough into buns, quite small, set them very close together on tins, and let them rise. When all of a sponge, brush the top with a little milk and molasses mixed. Bake in a quick oven, fifteen or twenty minutes.

Buns Without Eggs. Three cups of warm milk, one cup of sugar, one cup of yeast; make a batter of this with flour, and when it has risen very light, add a cup of butter, a cup of sugar, a cup of currants and a little nutmeg; work in flour enough to roll out, and let it rise very light. Make it into cakes, and let them stand in the tins awhile before baking.

Easter Buns. Boil a little saffron in a small quantity of water, strain and cool it; make a sponge of a quart of flour and warm milk, making it yellow with the saffron decoction; add a gill of yeast or a small cake of compressed yeast dissolved; set it to rise in a warm place, covered; when very light, beat into it a half pound of granulated sugar and ¼ pound of butter, rubbed to a cream; four eggs beaten very light, a tablespoonful of salt, and half a nutmeg grated; mold into a soft dough and let it rise again; when as light as possible roll out in a middling thick sheet, and cut into round cakes with a cutter; bake on flat tins, well buttered; they must be permitted to stand until very light, after they are cut out, before putting them into the oven; while hot, wash over with milk, in which is a little sugar. Make an icing with the white of an egg and white sugar, and with it form a large E in the center of the bun. For variety, a few currants may sometimes be sprinkled into the dough.

From the above standard recipes a cook can vary to suit her tastes and fancies without much difficulty. These recipes often appear in print, with little variation, under different names.

Bunting, a bird of several species; also, a thin woolen stuff, of which the colors or flags and signals of ships are made.

Burdock, a common weed, with leaves as large as those of pie-plant, and similar in shape. The root has been popular as a "blood-purifier." The name also has been applied to the cockle-bur, a common plant of poisonous odor and bearing thorny burs.

Burnet, a plant the leaves of which are used as salads, put into soups, etc. When slightly bruised they smell like cucumber, and they have a somewhat warm taste. But little cultivated.

Burns and Scalds. The best application for a burn or scald we believe to be common wheat flour. This is always at hand, and while it requires no skill in using, it produces most astonishing effects. The moisture produced upon the surface of a slight or deep burn is at once absorbed by the flour, and forms a paste which shuts out the air. As long as the fluid matters continue flowing, they are absorbed and prevented from producing irritation, as they would do if kept from passing off by oily or resinous applications, while the greater the amount of those absorbed by the flour the thicker the protective covering. Another advantage of the flour covering is, that next to the surface it is kept moist and flexible. It can also be readily washed off without further irritation in removing. It may occasionally be washed off very carefully when it has become matted and dry, and a new covering sprinkled on. The next best method is to plunge the part in cold water, or apply cold water to it, until the pain is considerably reduced, then spread on any alkaline poultice, as a cloth or cotton batting saturated with sweet or linseed oil and lime-water, chalk, or a solution of saleratus or cooking soda. When the burn is so severe as to take the skin off, put on sweet cream or milk. In serious cases, use no strong drug until a physician is called and he advises it. It would be safe, however, to use the following, which is very efficient: Take equal parts of turpentine, sweet oil and beeswax; melt the oil and wax together, and when a little cool add the turpentine and stir until cold, which keeps them evenly mixed. Apply by spreading upon thin cloth: linen is the best.

Body in Flames. Lay the person down on the floor of the room, and throw the table-cloth, rug, or other large cloth over him, and roll him on the floor.

Burst, sometimes used in the sense of Rupture, which see.

Bush, in mechanics, a perforated piece of metal, as hard brass, let into certain parts of machinery to receive the wear of pivots, journals and the like, as in the pivot-holes of a clock, the hub of a cart-wheel, etc. Also, any similar lining of a hole with metal, as the vent of a gun. In the larger machines, such a piece is called a "box." Bush metal is an alloy of copper and tin, used for journals, the lining of pivot-holes, etc.

Bushel. A standard bushel is eight inches deep and 18½ inches inside diameter, containing 2,150.42 cubic inches. The heaped bushel requires the middle to be six inches higher than the circumference, and contains 2,748 cubic inches in all. The half bushel measure, correspondingly, should be heaped up about four inches in the middle. To find the number of bushels, struck measure, any box will hold, multiply the length, width and height together, in feet, divide by 56 and multiply by 45.

The table on the next page covers every article whose weight per bushel is regulated by law in each of the States and Territories. Where blanks occur in the table it is because there is no law governing the subject. In several of the States no laws fixing standard bushels have ever been passed. In such States the standard fixed by Congress is adopted; but, with a few exceptions, Congress has fixed no such standards. The revenue officers, in fixing the amount of duties upon imported grain, are directed to allow 60 pounds per bushel for wheat, 56 for corn and rye, 48 for barley, 32 for oats, 60 for peas, and 42 for buckwheat.

WEIGHT OF THE BUSHEL OF AGRICULTURAL PRODUCE, ETC., AS ESTABLISHED BY LAW IN THE UNITED STATES AND TERRITORIES, COMPARED WITH THE MOST RECENT ENACTMENTS.

	California.	Connecticut.	Dakota.	Delaware.	Illinois.	Indiana.	Iowa.	Kansas.	Kentucky.	Louisiana.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Missouri.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New York.	Ohio.	Oregon.	Pennsylvania.	Rhode Island.	Vermont.	Washington Ter.	Wisconsin.
Apples	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	45	..	..	..	45	..
Barley	50	48	48	..	48	48	48	48	48	32	48	..	48	48	48	48	48	50	..	48	48	48	46	47	..	48	45	48
Bran	..	..	..	..	20	..	20	20	20	..	..	..	..	..	..	20	20	..	..	..	..	..	..	..	..	..	..	..
Broom-Corn Seed	..	..	..	..	..	..	30	..	30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Buckwheat	40	48	42	..	52	50	52	50	52	..	48	..	48	48	42	52	52	40	..	50	48	50	42	48	..	46	42	42
Carrots	..	55	..	..	..	..	..	..	..	..	50	..	..	..	..	..	..	..	..	..	..	..	..	..	50	..	50	..
Castor Beans	..	..	..	..	46	46	46	46	..	..	..	..	..	46	..	46	46	..	..	..	..	..	..	..	..	..	..	..
Coal, Mineral	..	..	..	..	80	80*	80	80	..	..	..	..	..	80	..	80	80	..	..	..	..	80†	..	..	..	..	..	..
Corn, Shelled	52	56	56	56	56	56	56	56	56	56	56	..	56	56	56	56	56	52	56	56	58	56	56	56	..	56	56	56
Corn, in Ear	..	..	72	..	70	68	70	70	..	..	..	..	..	70	..	..	70	..	..	..	..	70	..	..	..	..	..	..
Corn Meal	..	50	..	..	48	50	..	..	50	..	..	..	50	50	..	..	50	..	50	..	..	50	..	..	50	..	..	..
Cranberries	..	..	..	..	..	..	..	..	..	..	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dried Apples	..	..	..	..	24	25	24	24	..	..	..	..	..	22	28	24	24	..	..	..	..	25	28	..	..	..	28	28
Dried Peaches	..	..	..	..	33	33	33	33	..	..	..	..	..	28	28	33	33	..	..	..	..	33	28	..	..	..	28	28
Dried Plums	..	..	..	..	..	..	..	..	..	..	..	..	..	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Flax Seed	..	..	..	..	56	..	56	56	56	..	..	..	..	56	..	56	56	..	..	55	55	56	..	..	..	..	..	56
Grass Seed, Blue	..	..	..	..	14	14	14	..	14	..	..	..	..	14	..	14	14	..	..	..	..	..	..	..	..	..	..	..
Grass Seed, Clover	..	..	60	..	60	60	60	60	60	..	..	..	..	60	60	60	60	..	..	64	60	62	60	62	..	60	6c	60
Grass Seed, Hungarian	..	..	..	..	..	..	45	..	..	..	..	..	..	50	..	..	60	..	..	..	..	50	..	..	..	..	..	...
Grass Seed, Millet	..	..	..	..	..	..	45	..	..	..	..	..	..	50	..	..	85	..	..	..	..	50	..	..	..	..	..	..
Grass Seed, Orchard	..	..	..	..	..	..	..	..	..	..	..	..	..	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Grass Seed, Red Top	..	..	..	..	..	..	..	..	..	..	..	..	..	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Grass Seed, Timothy	..	..	42	..	45	45	45	45	45	..	..	..	..	45	..	45	45	..	..	..	44	45	..	..	..	42	40	46
Hair, Plastering	..	..	..	..	8	..	..	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..	..	..	..	..	..	..
Hemp Seed	..	..	..	..	44	44	44	44	44	..	..	..	..	44	..	44	44	..	..	..	..	44	..	..	..	..	..	..
Lime, Unslacked	..	..	..	..	80	..	80	..	..	..	..	..	..	..	..	..	80	..	..	..	..	..	..	..	..	..	..	..
Malt	..	..	..	..	38	..	..	..	..	..	..	..	..	..	..	..	30	..	..	..	..	34	..	..	..	..	..	..
Mangel-Wurzel	..	60	..	..	..	..	..	..	..	..	60	..	..	..	..	..	..	..	..	..	..	..	..	..	50	..	..	..
Oats	32	32	32	..	32	..	33	32	33⅛	32	30	..	32	32	32	35	34	32	30	30	32	33	36	30	..	30	35	32
Onions	..	50	..	..	57	46	57	57	57	..	52	..	52	54	..	57	57	..	..	..	..	..	..	..	50	..	50	..
Onions, Top	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25	..	..	..	..	..	..	..	..	..	..	..
Osage-Orange Seed	..	..	..	..	..	..	32	..	..	..	..	..	..	33	..	..	32	..	..	..	..	..	..	..	..	..	..	..
Parsnip	..	45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	60	..	..	60	..	..	50	..	..	..
Pears	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	45	..	..	..	45	..
Peas	..	60	..	..	..	..	..	..	..	..	60	..	..	60	..	..	60	..	..	..	60	..	..	..	..	60	60	..
Potatoes, Irish	..	60	60	..	60	60	60	60	56	..	..	56	60	60	..	60	60	..	60	60	60	60	60	56	60	..	60	60
Potatoes, Sweet	..	..	..	..	55	..	46	..	..	..	..	..	..	56	..	..	50	..	..	..	..	50	..	..	..	..	..	..
Ruta-Baga	..	60	..	..	..	..	..	..	..	..	60	..	..	..	..	..	..	..	..	..	..	..	..	..	50	..	50	..
Rye	54	56	56	..	56	56	56	56	56	32	56	..	56	56	56	56	56	54	56	56	56	56	56	56	..	56	56	56
Salt, Coarse	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	85	..	..	..	..
Salt, Fine	..	..	..	..	55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	62	..	..	..	..
Salt, Ground	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	70	..	..	..	..
Sand	..	..	..	..	..	..	130	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sugar Beets	..	60	..	..	..	..	..	..	..	..	60	..	..	..	..	..	..	..	..	..	..	..	..	..	50	..	50	..
Turnips	..	50	..	..	55	..	..	..	..	..	50	..	..	58	..	..	55	..	..	..	..	..	..	..	50	..	50	..
Wheat	60	60	60	60	60	60	60	60	60	60	60	..	60	60	60	60	60	60	60	60	60	60	60	60	..	60	60	60
White Beans	..	60	60	..	60	60	60	60	60	..	64	..	..	60	..	60	60	..	60	..	62	60	..	..	..	60	60	..

"Salt" in Illinois, Indiana, Iowa, Kansas, Kentucky, Missouri and Nebraska is 50 pounds to the bushel. In Michigan, "Michigan Salt" is 56 pounds to the bushel. In Massachusetts, "Salt" is 70 pounds to the bushel.

Coal in Kentucky is 76 pounds per bushel, *except* Wheeling coal, which is 84, and Kentucky River, which is 78 pounds per bushel, and Adrian Branch, or Cumberland River coal, which is 72 pounds per bushel. Cotton seed is 33 pounds to the bushel in Missouri.

Sorghum seed is 30 pounds to the bushel in Iowa and Nebraska. Strained honey is 12 pounds to the gallon in Nebraska.

* Mined within the State, 70 pounds; without the State, 80 pounds.

† Bituminous,—Cannel Coal, 70 pounds.

Bushing, a ring, tube or lining placed in a hole and sometimes acting as a journal-box; a thimble; also, the operation of fitting bushes into holes or places where wear is to be received, or friction diminished, as pivot-holes, etc.

Business Laws. Ignorance of the law excuses no one.

It is a fraud to conceal a fraud.

The law compels no one to do impossibilities.

An agreement without consideration is void.

Signatures made with a lead pencil are good in law.

A receipt for money paid is not legally conclusive.

The acts of one partner bind all the others.

Contracts made on Sunday cannot be enforced.

A contract made with a minor or a lunatic is void.

Contracts for advertisements in Sunday newspapers are invalid.

Principals are responsible for the acts of their agents.

Agents are responsible to their principals for errors.

Each individual in a partnership is responsible for the whole amount of the debts of the firm, except in cases of special partnership.

A note given by a minor is voidable.

Notes bear interest before maturity only when so stated.

It is not legally necessary to say on a note, "for value received."

A note drawn on Sunday is void.

A note obtained by fraud, or from a person in a state of intoxication, cannot be collected.

If a note be lost or stolen, it does not release the maker; he must pay it.

An endorser of a note is exempt from liability if not served with notice of its dishonor within 24 hours of its non-payment.

The maker of an "accommodation" bill or note is not bound to the person accommodated, but is bound to all other parties precisely as if there was a good consideration. An "accommodation" bill or note is one for which the maker has received no consideration, he having lent his name or credit for the accommodation of the holder.

No consideration is sufficient in law if it be illegal in its nature.

Checks or drafts must be presented for payment without unreasonable delay.

Checks or drafts should be presented during business hours.

If the drawee of a check or draft has changed his residence, the holder must use due or reasonable diligence to find him.

If one who holds a check, as payee or otherwise, transfers it to another, he has a right to insist that the check be presented that day, or at the farthest, on the day following.

A note indorsed in blank (the name of indorser only written) is transferable by delivery, the same as if made payable to bearer.

If time of payment of note is not named, it is payable on demand.

The time of payment of a note must not depend upon a contingency. The promise must be absolute.

A bill may be written upon any kind of paper, either with ink or pencil.

The payee should be named in a note, unless it is payable to bearer.

An indorsee has a right of action against all whose names were on the bill when he received it.

If the letter containing a protest of non-payment be put into the post-office, any miscarriage does not affect the party giving notice. Notice of protest may be sent either to the place of business or of residence of the party notified.

The holder of a note may give notice of protest either to all the previous indorsers or only to one of them; in case of the latter he must select the last indorser, and the last must give notice to the last before him, and so on. Each indorser must send notice the same day or the day following. Neither Sunday nor any legal holiday is counted in reckoning time in which notice is to be given.

The loss of a note is not sufficient excuse for not giving notice of protest.

If two or more persons, as partners, are jointly liable on a note or bill, due notice to one of them is sufficient.

If a note or bill is transferred as security, or even as payment of a pre-existing debt, the debt revives if the note or bill be dishonored.

An indorsement may be written on the face or back.

An indorser may prevent his own liability to be sued by writing "without recourse," or similar words.

An oral agreement must be proved by evidence. A written agreement proves itself. The law prefers written to oral evidence, because of its precision.

No evidence can be introduced to contradict or vary a written contract; but it may be received in order to explain it, when such explanation is needed.

Written instruments are to be construed and interpreted by the law according to the simple, customary and natural meaning of the words used.

The finder of negotiable paper, as of all other property, must make reasonable efforts to find the owner, before he is entitled to appropriate it for his own purposes. If the finder conceal it, he is liable to the charge of larceny or theft.

Joint payees of a bill or note, who are not partners, must all join in an indorsement.

One may make a note payable to his own order, and indorse it in blank. He must write his name across its back or face the same as any other indorser.

After the death of a holder of a bill or note, his executor or administrator may transfer it by his indorsement.

The husband who acquires a right to a bill or note which is given to the wife, either before or after marriage, may indorse it.

"Acceptance" applies to bills and not to notes. It is an engagement on the part of the person on whom the bill is drawn to pay it according to its tenor. The usual way is to write across the face of the bill the word "Accepted."

Business Maxims. Caution is the father of security.

He who pays beforehand is served behindhand.

If you would know the value of a dollar, try to borrow one.

Be silent when a fool talks.

Never speak boastingly of your business.

An hour of triumph comes at last to those who watch and wait.

Word by word Webster's big dictionary was made.

Speak well of your friends—of your enemies say nothing.

Never take back a discharged servant.

If you post your servants upon your affairs, they will one day rend you.

Do not waste time in useless regrets over losses.

Systematize your business, and keep an eye on little expenses. Small leaks sink great ships.

Never fail to take a receipt for money paid, and keep copies of your letters.

Do your business promptly, and bore not a business man with long visits.

Law is a trade in which the lawyers eat the oysters and leave the clients the shells.

Have nothing to do with an unlucky man.

Be both cautious and bold.

Make your bargains with but few words.

Reduce all important contracts and agreements to writing, leaving no merely verbal conditions or understandings to be remembered. In most cases there should be two or three copies of the agreement, to be held by as many parties.

Do not tell the secrets of your business to any one except those to whom it is necessary.

Short (frequent) settlements make long friends.

Learn your business thoroughly.

Keep at one thing.

Observe system and order in all you do and undertake.

Be self-reliant, after consulting friends.

Earn your money before you spend it.

Never buy anything because it is cheap.

Make few promises, and be sure to fulfill promptly all you do make.

Keep yourself informed on the discoveries, doings and reforms of the age.

Learn how to be silent.

Do not abandon the superintendency of a work because you have employed a man to execute it.

In collecting debts, never give the idea that you are in need of the money; that you called because you happened to be in the neighborhood; never think you have done wrong because your debtor gets angry; never leave a debtor without his setting a time when he thinks he can pay, and never fail to be on hand at the time set; shame the debtor into an arrangement to pay by installments, or something every week or month; drop into his favorite haunts, and, without dunning him, make him uneasy.

Never "fool" in business matters.

If you have a place of business be found there when wanted.

A man of honor respects his word as he does his bond.

In all thy quarrels, leave the door open to reconciliation.

Do not allow idleness to deceive you, for while you give it to-day it steals from you to-morrow.

Butter, an oily substance obtained from milk or cream by churning. The amount of butter matter contained in pure milk usually varies from two and a half to six and a half per cent. It is already formed in the udder of the cow, and churning merely separates it from the cheese and whey. In all good milk of the cow it is enclosed in little round globules held in suspension or floating in other substances. As soon as the milk is set at rest after leaving the udder, these particles, being lighter than the other components of the milk, work their way to the surface, the largest rising first. The smaller the particles the more they are clogged with other parts of the milk on reaching the surface. Consequently, the richest cream and the best butter are obtained by the skimming of milk which has stood only a few hours. Suppose three skimmings to have been made, at 6, 12 and 18 hours, the last will give the poorest cream and butter; the first the richest, and the second a medium quality. For reasons stated under the head of Milk, the last milk given by the cow will produce richer and more fragrant butter than the first. The difficulty of separating the butter particles from the milk increases in proportion to its thickness and richness. This is the reason why, in winter, when the cows are dry fed, and the milk is thicker and richer, the cream rises much more slowly than in summer. This difficulty is met by raising the temperature of the milk, or by mixing a little warm water with it when it is set. The quantity of butter obtained from milk treated in this way will be greater, but the quality will be somewhat poorer. Although the best butter is made from cream which has stood about 12 hours, the poorness of the subsequent product induces most dairymen to make their butter from all the cream obtained at one setting. This course secures the best market butter. Everything relating to the treatment of Milk and Cream has been treated under those heads. It is necessary here simply to call the attention of the dairyman to the incalculable importance of the strictest cleanliness in every step of the process of butter-making. It is impossible to lay too much stress upon this point. Cleanliness contributes perhaps more than anything else to the production of good butter. The known absence of this requisite in any dairy is sufficient to lessen the market value of its product, for there are few articles of food about which the public is more fastidious than about butter, or for absolute purity and sweetness in which it is willing to pay a higher price. A slight taint in meat is no great bar to its sale; a much slighter taint in butter would either render it unmarketable or salable only at such a price as would be ruinous to the dairyman. Milk and cream are exceedingly sensitive to even the slightest taint in the air, and any want of sweetness produced in them by foul odors or want of cleanliness in handling will infallibly betray itself in the butter. From this the butter-maker will at once see that the greatest attention must be paid to the milk and dairy room.

Where possible, the butter dairy should be a separate building. It should be at such a distance from the yard as to be free from all the impurities of the latter's air, and still not too distant. Especially should it be removed from all damp, low places subject to noxious exhalations. It should be constantly kept sweet and clean by the copious use of pure water, and in case any milk be spilled, even if it is but a single drop, it should be immediately washed up with fresh water. Taints in the air imperceptible to our senses are quite sufficient to injure things so sensitive as milk and cream. Where necessity compels the dairyman to use a room in the house, it should, in warm seasons, be on the *north* side, and used for nothing else. If a cellar be used, it should be properly prepared: it should be large and dry, and have an uncemented bottom of gravel or loam. No articles of any description, except such as are needed for the purposes of the dairy, should be kept in it. The temperature should be kept uniform and at about 50 degrees. The cows' udders should be washed and wiped dry before milking, as well as the hands of the milker, and all the vessels into which the milk is drawn, or in which it is placed to set, should be carefully scalded with *boiling* water and cleaned. Milk, if intended to be used for butter-making, should never be placed on the bottom of the cellar. Shelves at a height of from six to eight feet from the bottom, with a free circulation of pure air from the windows, will be found most advantageous. Cream will rise here in 12 hours which it would take 24 hours to produce on the bottom of the cellar. A very simple milk-stand may be made by fixing an upright working on a pivot in any convenient portion of the milk-house, and fixing to it circular or octagonal shelves. If possible, the dairy house should be constructed over or near a spring of clear running water, and this allowed to circulate constantly under the milk-stand. Milk-pans are usually either of tin or earthenware, the main objection to the latter being that they are too liable to break. There are several contrivances designed to obviate the necessity of skimming the milk. These are described under the head of Milk-strainers. There is some diversity of opinion as to the best depth of pan. Some use a shallow pan not more than two inches in depth. Others maintain that deep-setting vessels are preferable, inasmuch as they entail much less labor, save the expense of a large number of pans and the greater labor of cleaning, make it possible to secure a larger amount of cream, and expose much less of the milk surface to the action of the air. If there is plenty of cold spring water in which to set such cans, the improvement is said to be still more marked. These cans will be found described under the proper heading. Their advocates claim that with these cans, properly used, much better butter is produced than by the open pan process, and that perfect uniformity of product is attained, this latter being a point the importance of which is clear to every thinking dairyman. Further, they contend that good butter may be made in August with quite as much certainty as in June, and, as the milk is not allowed to ferment in the least, the skim milk is much more valuable as food for calves and pigs.

The quality of the butter, as every farmer and dairyman knows, is greatly affected by the food. Carrots, clover, turnips, blue-grass, etc., will each give a very different flavor to the milk and butter. The farmers or dairymen should see that when their cows are at pasture they are kept away from stagnant pools as well as from sour, marshy land. Upland pasturage produces a much better quality of milk than bottom-land. When fed dry, he should take care that the cows get no moldy or otherwise objectionable food. They should have access to pure spring water. Where possible, it is well to have the milk-house so arranged as to allow a stream of pure, cold water to run through troughs, in which the cans may be so placed that the water will be a little above the level of the cans. The temperature, as before stated, should be about 56 degrees.

In this way the milk can be kept sweet thirty-six hours. Some let their milk stand this long; others say that twenty-four hours is sufficient. The cream must not be allowed to become either too cold or too warm. In either of these cases the butter is proportionately longer in coming. The temperature should range from 55° in warm weather to 64° in winter. In order to make this certain, a thermometer, such as is made specially for the dairy, should be used in every milk-room. Should the cream be too warm, it ought either to be put in the refrigerator or the vessel containing it placed in another containing cold water. This is in every way preferable to putting ice in the cream. In winter it may be warmed by placing it in a warm room in a *closely covered* vessel. Everything thus being ready it is placed in the churn, of which the various kinds will be found described in the proper place. The churn should be kept scrupulously clean, for which purpose *boiling* water should be used, and constant airing. Never keep the churn, or indeed *any* wooden vessel, closed when not in use.

Churning. The temperature of the cream and the velocity of the churn are very important elements in the process of churning. There seems to be a certain amount of agitation needed to produce the butter at a normal temperature, which we place at 60°, Fahr., and this requisite agitation is effected by making sixty revolutions or strokes of the churn for twenty to thirty minutes. The effect upon the cream of this amount of agitation and aeration seems to be precisely that which is required to produce the best quality of butter from cream that has undergone the necessary amount of ripening. This ripening process is effected by keeping the cream for forty-eight hours on the average, that is to say, if the cream has been seventy-two hours, or three days, in collecting, or there have been three skimmings, its condition will be equivalent to that of cream of one skimming which has been kept forty-eight hours. The cream should have been gathered from milk that has been set no longer than thirty-six hours. If cream in a small dairy cannot be churned twice a week, being kept only three days, it should be kept at a lower temperature, not exceeding 45°, until twenty-four hours before churning, when it should be raised to a temperature of 60° for a whole day and night before it is put into the churn. As this point is very important it may be well to repeat the rule in this case, viz.: Cream should be skimmed after the milk has been set thirty-six hours; it should be kept forty-eight hours before churning at a temperature of 55° to 60°; it should go into the churn at 60°; it should be churned at least twenty minutes, and not more than thirty, the churn moving about sixty strokes or turns in a minute.

This rule is subject to such changes only as will equalize the effect; for instance, if the temperature is lower than 55° to 60°, the cream may be kept longer; if the cream is churned at a higher temperature than 60°, the churn may be moved more slowly; and if the cream is colder, the motion may be more rapid. Even when there is cream enough for daily churning of six pounds only, it is better to churn daily, and for this reason: when the conditions are always the same the butter will always be of the same quality. There are two good qualifications for a dairyman: One is to be able to make good butter, the other is to make good butter always, and to have no variance in the quality at any time or season. When the butter appears in the churn in small grains or pellets, the churning should stop. One can very soon learn to recognize the sound made by the churn when the butter has come. Over-churning has the effect of injuring the texture of the butter and changing the waxy, almost crystalline, appearance into a soft, greasy one. When the butter is in the best condition after churning it appears as a mass of small granules loosely adhering together, but which easily fall apart when floated in cold water. These granules are no larger than the capsules of beet-seed, and many of them are not more than half or quarter as large; and when some cold water is poured into the churn to harden them they are kept separate, and do not cohere in a mass.

Butter of this form is better made in a rectangular or other dashless churn than in those with dashers, because the granules are not crushed, pressed or rubbed when there is no dasher used. (See Churns.) The advantage of this form of butter is that it can be completely freed from buttermilk and can be washed, salted and packed into pails or tubs, or made into cakes without any working.

Working. When the buttermilk is drawn off a small hand-strainer should be used to catch any of the small fragments that may run off with the milk. After the milk is run off, cold water is put into the churn until the butter floats; the churn is slightly moved to bring the water into contact with all the butter, and the water is drawn off. This is repeated until the water comes off perfectly clear, when the butter is ready for salting. This may be done in a rectangular churn without removing the butter, as the butter and salt may be thoroughly mixed by giving a few turns to the churn. When other churns are used, butter is lifted out with a ladle—it should never be touched by hand—into the bowl or butter-worker and mixed with salt, in the usual manner. If the butter is worked at all it should be done at once, as unless separated from the milk, which is mixed with it, butter soon spoils. In working the butter the usual course is to wash it in pure, cold water. In doing this the hand should never be allowed to touch the butter, even the least amount of perspiration being liable to injure the quality. A spatula or ladle (Fig. 4) made for the purpose, and a wooden bowl or tray should be used where the quantity of butter is not too large. In the latter case butter-workers may be employed. The one manufactured by the Vermont Machine Company, at Bellows Falls, Vt. (Fig. 1), is simple and efficient, and gives about the right motion, not grinding the butter into a salvy mass. Fig. 2 represents a nice machine, manufactured by A. H. Reid, of Philadelphia.

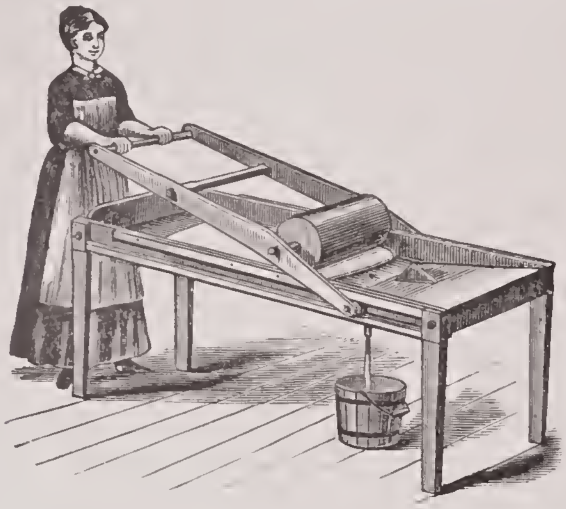


Fig. 1.—*Butter-Worker.*

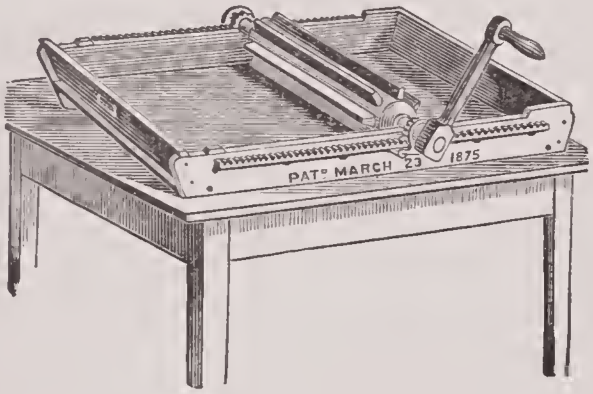


Fig. 2.—*Butter-Worker.*

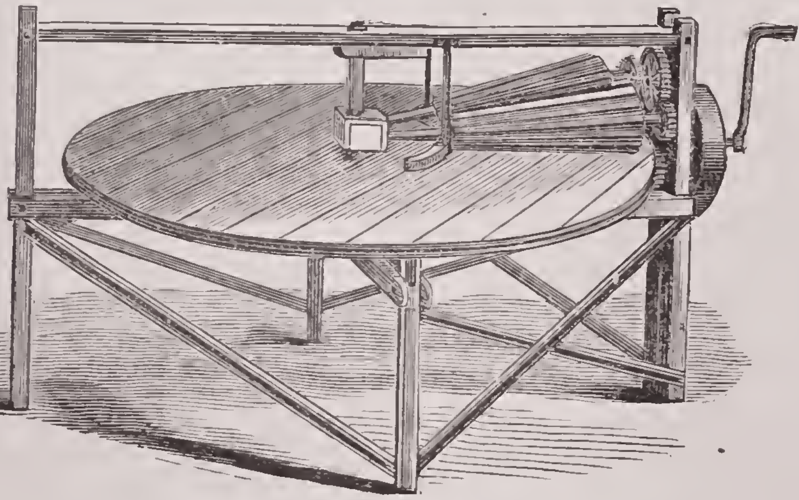


Fig. 3.—*Power Butter Worker.*

The power butter worker is to the creamery what the harvester and self-binder is to the field. Fig. 3 represents Mason's Worker, as supplied by Chas. P. Willard & Co., Chicago, Ill. It will work hard or soft butter with equal facility. Owing to the revolving table and fluted roller, there is no sliding or rubbing motion, and the grain of the butter is not injured. Its work is so uniform that the butter needs less working than by ordinary methods. As a large mass of butter is worked at one time, and in a few minutes, the table, being on an incline, allows the buttermilk or brine to run off as fast as worked out. This machine is designed to be operated by steam power, but can also be operated by hand. In large creameries it will save the labor of one man.

Ladle. Among the many useful articles in butter-making is the ladle. One, as represented in Fig. 4, costs but little, and should be had by every housewife.

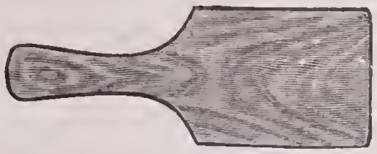


Fig. 4.—*Butter Ladle.*

Tray. The butter tray illustrated by Fig. 5 is designed to hold the butter when taken from the churn to be re-worked and packed for market. The oval cover, which increases the capacity of the tray one-third, is made to fit tight, to exclude bad air and dust. They are strong and durable, and made in nests of three.

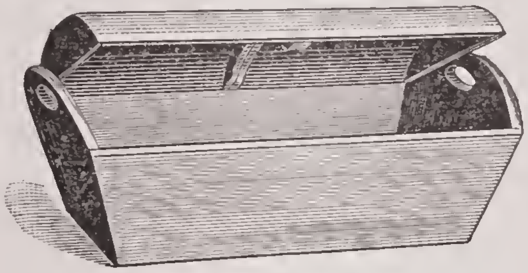


Fig. 5.—*Butter Tray.*

It used to be considered that butter required to be worked over, cut, squeezed and pressed, worked even with the hands at one time, almost in the manner in which a brick-maker works his clay to fit it for the mold, and make it tough and plastic; or, more recently, with butter-workers, which have almost the same effect. Working butter, if it is at all necessary, is a necessary evil; because it is an injurious operation required to avoid the more injurious presence of easily decomposed material (milk) in the butter. But there is no necessity for working butter at all. When it is made so as to come out of the churn in small grains it may be washed perfectly free from the buttermilk with the greatest ease, and the salt may be mixed in with it in the most even and intimate manner without disturbing the texture in the least, by the slightest degree of working.

It is a mistake to suppose that washing butter injures the flavor. It cannot; but it does wash away most of the foreign ingredients, the taste of which, as they decompose, some persons, on account of association, prefer should remain. Butter is an oil or fat, totally insoluble in water, and all its flavors are component parts of the fat, which cannot possibly be separated from it by contact with water. In washing granular butter it is necessary to use cold water, which sets or hardens the granular atoms and prevents them combining in a mass. When butter is taken from the churn in masses, the water should not be so cold as to harden these, otherwise the milk cannot be removed easily, and then the butter will not keep for any length of time, in spite of all precautions. In such a case the butter placed in the bowl is to be worked down with the ladle in thin slices, so as to provide outlets for the buttermilk to escape. The milk which escapes and flows to the bottom of the bowl should be poured off, and the butter washed with clear, pure water; the butter is then turned in the bowl and sliced in the opposite direction and again washed, and if the work has been skillfully done this is all the working that is necessary. The main point to be observed in working butter is to avoid plastering it with the implement used, whether it be the hand, the ladle, or a lever or a rotary crusher. The butter may be squeezed with impunity, to a considerable extent, but if it is plastered, or the implement is drawn over it with a sliding motion, it is seriously damaged, and the texture destroyed.

Butter is salted as a means of preservation. Some persons prefer it unsalted when it can be procured fresh. In this condition are preserved all the most delicate flavors which are lost when the salt is added. In the domestic dairy, butter may be sent to the market in this way, or even direct from the churn without washing, and with all its native buttermilk adhering, as an unusual delicacy. But for ordinary purposes about six per cent. of salt is added to the butter; this is equal to one ounce to the pound. The salt is sprinkled evenly over the butter at the last of the working, when it is sliced or gashed. The butter is then loosely gathered together and it is set away in the dairy for 24 hours. During this time some milky water usually escapes from it, and this is poured off at the final working. This is done in the same manner as before, and is continued until any streakiness in the butter is removed, and the whole is brought to an even and regular color and consistence. Some persons color their butter when working it, but this is not to be advised, for the color cannot be made even, and the butter will be streaky and patchy in spite of the most prolonged and injurious mixing. Some frightful examples of such butter are often seen at rural hotels and railroad restaurants. Coloring should always be done in the churn by mixing the proper quantity of prepared color in with the cream. The usual quantity is one teaspoonful to three gallons of cream. This is sufficient with the best Jersey and Ayrshire cream; but each dairyman should test that matter for himself, as the natural color of the cream varies with the cows, the feed, and the manner of keeping the milk and cream.

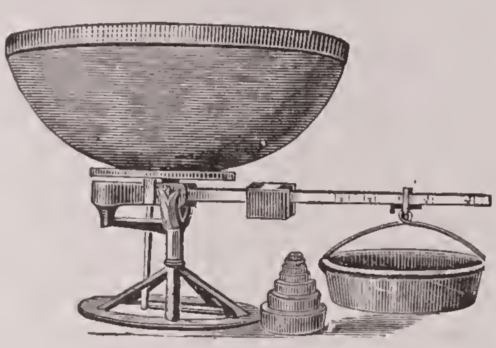


Fig. 6.—*Butter-Salting Scale.*

By the use of a salting scale (Fig. 6), dairymen cannot fail to salt butter uniformly. Every dairy-woman knows the difficulty of doing this by guesswork, or by the old method of weighing. This scale will salt from three-quarters of an ounce to one ounce and a quarter of salt to the pound of butter in weight.

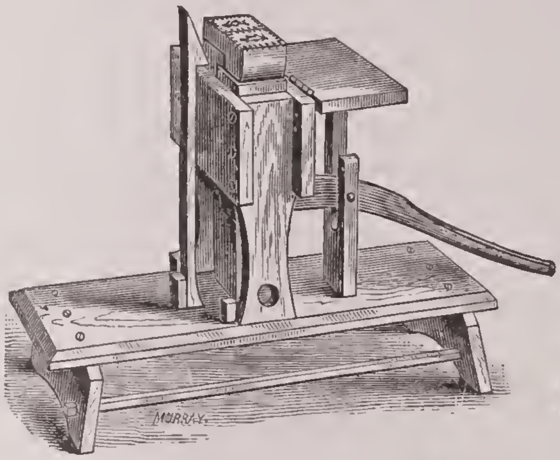


Fig. 7.—*The Nesbit Butter-Print Machine.*

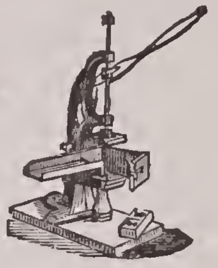


Fig. 8. *Reid's Butter Printer.*

For a family dairy a desirable manner of putting up the butter is in quarter, half or whole pound cakes pressed in a mold, as shown in the cuts. This is turned out of beech, birch, or soft maple wood, and made of different sizes.

The butter is now ready for PACKING. If to be kept long, or sent considerable distances, it is packed in jars or tubs. If to be used at home, stone jars are best; otherwise tubs, for fear of breaking. The tubs, or firkins, should be of white oak. They should be filled with boiling water and allowed to soak twenty-four hours. A pound of soda, placed in a thirty-two pound box or firkin, with boiling water poured upon it, dissolved, well stirred, and allowed to stand over night, is a cheap and easy method of frequently avoiding great loss. New pine-wood should never be used for butter-boxes or firkins. After scalding, the tubs should be filled with strong brine and stand two or three days. This should then be turned out, the tubs rinsed with pure, cold water and the sides rubbed with fine salt. They are then nearly filled with butter, a piece of clean muslin cloth is laid on the top, a strong brine is poured through the plug-hole so as to fill up all interstices and exclude the air, the plug is put in and the butter kept in a clean, well-ventilated cellar. The firkins or jars should be kept absolutely free from the presence of all kinds of decaying vegetables, soap and everything which could impart an unpleasant odor to this most sensitive product. If the butter is to be kept long, the brine should be changed at least every two months. Another highly recommended method is to make a muslin bag, a little smaller than the tub, so that when filled there will be a space of one inch all round it, above and below. The butter, when ready, is packed in this muslin bag and placed in the tub; the head is put in with a 1½-inch hole in it. The space around the bag is filled with a strong brine and a plug put in reaching one inch below, so as to prevent the bag of butter from coming to the top. The sack will float in the brine and the air be absolutely excluded. The Irish method of packing is as follows: Take one part of fine sugar, one of nitre, and two parts of the best Spanish great salt: rub into a fine powder. This is mixed with the butter as soon as the latter is freed from the milk, in the proportion of one to sixteen. The butter is then pressed tight into the firkins, allowed to stand a fortnight: it then has a rich, marrowy flavor. Until the middle of May butter should, according to the advice of some, be packed in quarter firkins or tubs, with white-oak covers, and sent directly to market as fresh butter. From this time until the fall frost there is but little change in the product of the same dairy, either in color or flavor, and it may be packed in whole firkins and kept in a cool place.

The MARKETING of butter is an important part of the dairyman's business. A good deal of money is lost by mistakes in this respect. Good butter is thrown away when put up in ill-looking, frowsy, unsavory and repulsive packages. A good package will often sell butter of doubtful quality. Buyers are very much impressed with the sight of what they buy. To judge of butter requires a delicate sense of taste and smell, and but few persons are so expert in this way as to decide about the quality of what is shown to them, on the instant they touch a sample to their palate. But if any hesitation or doubt is felt, the sight of an unexceptionable package will help to determine this in favor of the butter. It is very much in this respect as a person is judged by his clothes: a well-dressed man and one with an agreeable presence is treated with more consideration by a stranger than one that comes in shabby dress or unclean person. The dairyman who is desirous of opening new outlets for his product must be very particular as to his packages, so that the first impression created by his goods may lead to a closer examination.

The package, too, has much to do with the preservation of the butter. If it is ill-made, of timber with a bad odor, or worm-eaten, so that the moisture of the butter will soon dry out and air get in, the butter will soon spoil and become rancid. In the family dairy the package is to be considered as much as in the business dairy, because there are times when a surplus product needs to be put away for use when the supply falls off or is suspended altogether for a time.

COLORING. The best method of coloring butter is to supply the cow with such food as will, both in winter and summer, naturally impart a good color to the product of the churn. In summer the cow usually gets such food as gives a fine natural color to the butter. In winter carrots are frequently fed, in which case care must be taken not to feed them in such quantities as to affect the flavor of the butter. If it be found desirable to color the butter artificially, care must be taken not to use the butter-colors of trade, of which the base is lard-oil and the coloring matter yellow aniline. A combination of annatto and curcuma or turmeric, when properly used, seems to be the most harmless and effective coloring matter. Put four ounces of annatto and one ounce of curcuma or turmeric in a jar with one pound of sal soda; put in a quart of hot water, and stir often. Keep in a warm place. After two days add three quarts more hot water. When dissolved strain through toweling. If any sediment remains dissolve in more soda and water. Two or three spoonfuls may be added to the gallon of cream when the churning begins. Some persons grate orange carrots in sweet milk, strain the milk, and add to the cream before churning. This method, it is contended by others, is injurious to the keeping qualities of the butter.

The following are the best recipes: Take of lard, butter or olive oil, 10 ounces; annatto, 10 drachms; turmeric, 1½ drachms; salt, 1 ounce; nitre, 1⅗ drachms; bromo-chloralum, 5½ drachms, and a sufficient quantity of water. The lard, butter or oil is put into a pan and heated in a water bath; the annatto and turmeric are then stirred into a thin paste with water, and this is gradually added to the fatty or oily matters, kept at a temperature of about 110° Fahr. The salt and nitre are next stirred in and the mixture heated to boiling, which is continued twelve to twenty-four hours, or until the color of the mixture becomes dark enough; the bromo-chloralum is then introduced, and the mass is agitated until cold, when it is put up in sealed cans. Or, annattoine, 8 ounces; pulverized turmeric, 10 drachms; saffron, 1½ drachms; lard oil, ½ gill; and butter, ½ pound. The butter is first melted in a pan over a water bath and strained through a fine linen cloth; the saffron is made into a tincture and, together with the turmeric and annattoine, is gradually stirred into the hot butter and oil, and boiled and stirred for about 15 minutes. It is then strained through a cloth as before and stirred until cool.

Dake's butter coloring is prepared by heating a quantity of fresh butter for some time with annatto, by which means the coloring matter is extracted, straining the colored oil and stirring it until cool.

To improve RANCID butter: Put the rancid butter into an iron vessel, and suspend that into another iron vessel containing water, after the fashion of a glue-pot. Put the whole over the fire until the butter is melted. By continuing the heat for some time, at about 190°, the cheesy matter will settle at the bottom, leaving the butter pure and transparent, like oil. When it is nearly cold take the pure butter off from the dregs that have settled, let it get cold and solid, and salt and pack it up in the same manner as ordinary butter. The use of the double vessel is to prevent the butter from getting a burnt taste.

Imitation butter, called "butterine," "oleomargarine," etc., has recently become very abundant in the cities, being furnished at a little more than half the price of good creamery butter. The ingredients consist of tallow or lard, for the body, cocoanut, olive and palm oils and salt for flavoring, and the usual annatto for coloring. If this imitation butter had nothing in it except these articles, and all these fresh and clean, it would be as healthful as genuine butter; but we may depend upon it that everything which is secretly compounded in a factory to be put clandestinely upon the market, is drugged and dirty. It is so with cheese, honey, sausage, soap, etc. The imitation butters are all sold, of course, as genuine, but one can distinguish them by their uniform and slightly granular appearance, like ice-cream, while genuine butter looks a little more greasy, fibrous or mottled, cellular, etc.

MELTED butter, to serve with certain dishes at table, is thus prepared: Put about two or two and a half ounces of butter into a very clean saucepan, with two tablespoonfuls of water; dredge in a little flour, and shake it over a clear fire, *one way*, until it boils. Then pour it into your tureen, and serve.

Butter, from the fruits and melons, consists of their fine pulp, obtained by filtering, evaporated down in a surplus quantity of their own juices, and sometimes spiced: see Apple Butter, Plum Butter, Pumpkin Butter, Muskmelon Butter, etc. Fruit butters at the grocery are generally adulterated.

Butterfly, the winged or "perfect" form of certain caterpillars, many of which are injurious to vegetation. They fly around in the daytime, while moths, the winged form of other classes of caterpillars, are nocturnal in their flights. All of any importance are described under the various fruits and vegetables which they infest.

Butter Scotch: see Candy.

Butternut, or White Walnut, a well-known nut-bearing tree, of great utility in wooden-ware, veneering, etc. See Forestry.

Buttonwood: see Sycamore, in article Forestry.

Butts, the short ridges made by the plow in the corners of irregular fields.

Buzzard, a large bird of the hawk family, more common South, feeding principally upon small animals, and often trespassing upon the poultry yard.

C

CAB, a kind of covered carriage, with either two or four wheels, drawn by one horse.

Cabbage. To grow a good crop of cabbage a rich soil is necessary, and concentrated manures can be used to advantage. Horse manure from horses fed largely on grain, hog manure, sheep manure and hen manure are all well adapted to the purpose. A good superphosphate, highly nitrogenized, is also an efficient fertilizer for cabbage. The ground should be plowed deep and made fine and mellow with the best pulverizers, and then it will be well to roll it down smooth, crushing the lumps and somewhat compacting the surface. When properly prepared the ground should be marked straight with a light marker both ways, about two feet nine inches apart, for ordinary improved Flat Dutch variety, and a moist, cloudy day selected for transplanting. The plants should have room in growing, so as to be of stocky growth and have numerous fine roots. In transplanting them it will pay to have a broad, shallow vessel containing a thin mud, and to immerse the feet of the plants in the mud and keep them there until ready to transfer them to the earth. Everything considered, a well-made dibber shod with an iron point is the best implement with which to plant them. One thrust into the earth will make a suitable hole for receiving the plant, and another made obliquely, so that the point of the dibber shall strike near the points of the roots, and then pressing toward the plant, so that the earth will be compressed against the entire root, will fasten the plant. The root should be fastened so firmly that it will break rather than pull up. Transplanting may be done any time between the middle of June and the Fourth of July, for fall and winter use, but for early cabbage transplant as early as possible after the ground gets into good condition. Sowing the seed must therefore be done in hot-beds or cold frame for early cabbage, and later in the season for later crops. After the plants have been set for a few days they should be hoed and all vacancies filled. A few will probably die from setting, and a few more be taken by the cut-worm, but no vacant spots should be tolerated. After one hoeing a horse and cultivator will take care of the plantation, and you need entertain no fear that you will stir the surface too much. In time of drouth, water thoroughly. When cold weather comes on in the fall, if there is a ready demand for good hard heads at $3, or over, a hundred, either without the roots for "*sauer kraut*," or with the roots for winter's use, take the hardened heads to market, and put the soft ones in the barn cellar for feeding. If the demand be poor and prices very low, bury in trenches or in a cheap outdoor cellar for selling in winter or spring.

The usual method of keeping cabbages over winter is to lay them on dry ground, roots up, close together, in three rows, the third on top of the other two, and cover them with earth eight to sixteen inches deep. They generally freeze through in December, and if a subsequent winter thaw threatens to spoil them, the heap or ridge is covered with straw, cornstalks or something of the kind. This ought always to be done in cold weather, so no warm spell will commence to thaw them out. Once thawing out, when in frozen earth, does not injure cabbage immediately, but the leaves soon afterward will commence to decay, and, if the weather be warm enough, the stem will commence its second growth, to seed.

Another method is to make a deep furrow in a dry position convenient to the buildings. In this the cabbage are planted, roots downward, and if the furrow is not deep enough, at an oblique angle or inclination; the plants or heads are placed in close contact with each other, and thus the work advances till the furrow is occupied from end to end; another furrow is then drawn as before, immediately alongside and parallel, and the process is repeated until a bed is formed four feet in width —confined to that width for convenience of access to cut the heads during winter. As many such beds are formed as may be necessary to hold the crop. Thus the cabbage remains till toward Christmas, when a covering of straw, hay, or other light material is spread over the whole. Some families place the head downward in the furrow, the root upward; where deep snows prevail this is a good plan, as the head is well preserved, and the root above indicates its position. Cabbage should never be kept in the cellar, as they are apt to decay there and generate a very foul and unhealthful atmosphere to be diffused throughout the house.

INSECTS. For cabbage lice and most other vermin, hot water, of the temperature of 140° to 150° Fahr., dashed over the leaves is sufficient. It will not injure the cabbage. To make the work more thorough, drench the under side of the leaves also with a syringe. Many other remedies, consisting of some drug dissolved in hot water, are prescribed by persons not knowing that it is the hot water that kills, and generally not the drug. The old remedies are salt, lime, ashes, plaster, sulphur, whale-oil soap, and decoctions of tobacco, black walnut leaves, China tree, etc.; but the most efficient drug for most cabbage pests is pyrethrum, an insect powder to be had at the drug stores. Mix half a tablespoonful of this powder with a gallon of water, and with this syringe the cabbage all over and under the leaves. Dusting with pyrethrum and flour, in similar proportions, is about as good, but more tedious.

Among the larger insects by far the greatest pest is the cabbage-worm, bred from small yellowish-green eggs on the under side of the leaf, and when hatched out consume the leaf. Fig. 1 is the male butterfly from this "worm." Remedies: Have the children capture the butterflies, especially the spring brood; kill the worms; plant early; select the firmest-headed varieties, and keep the plants as vigorous as possible. See Cut-Worm.

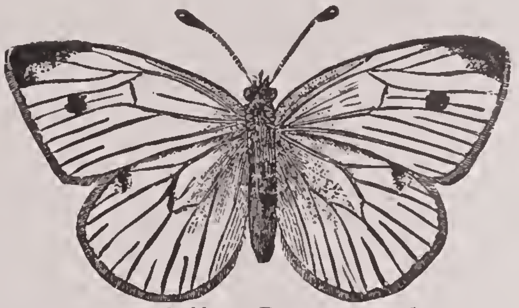


FIG. 1.—*Cabbage Butterfly: male.*

A parasite of the cabbage-worm has recently been imported, the propagation of which is encouraged by our economical entomologists. Its presence may be known by the livid, discolored and diseased appearance of the chrysalids of the worm, and at this time no sweeping remedies for the destruction of insects should be employed. To increase their numbers more rapidly on their first introduction, place the infested caterpillars or chrysalids in a box, which keep in a dry place until the parasites grow up and make their escape. No rubbish of any kind should be allowed in or about a garden, as it harbors and helps to multiply noxious insects. To raise a crop in spite of the pests, sometimes thick sowing or planting is resorted to; sometimes planting in a new place, not infested. But the chief care should be to keep the plants vigorous by proper cultivation, so that they can protect themselves against all insects and diseases.

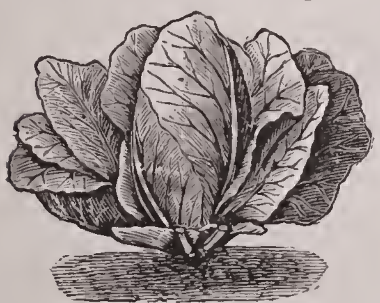


FIG. 2. *Landreth's Earliest.*

VARIETIES. *First Early: English Early York.* An old standard, but rather small, and does not stand the heat of summer well.

English Large York. Larger than the above and a little later.

Landreth's Earliest is an improvement on the last.

French Ox-Heart. Of the same type as the preceding, but not so robust.

Early Jersey Wakefield. Resembles Ox-heart; a standard early cabbage.

Early Sugar Loaf. Good for home use. Well known.

Second Early: Winningstadt. Standard; a little better South; head large, solid and cone-shaped, *Early Schweinfurth.* Very large. *Early Bleichfield Giant.* One of the very best. *Bloomsdale Early Market.* Hardy and of excellent quality. From Landreth & Sons, Philadelphia.

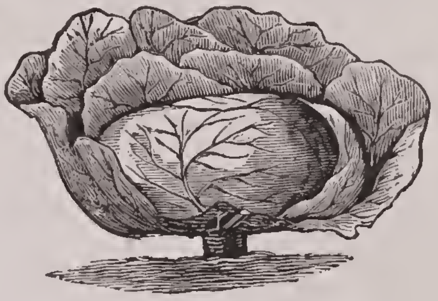


FIG. 3. *Bloomsdale Late Flat Dutch.*

Newark Early Flat Dutch. One of the best.

Early Ulm Savoy. One of the earliest, and unsurpassed in quality for family use.

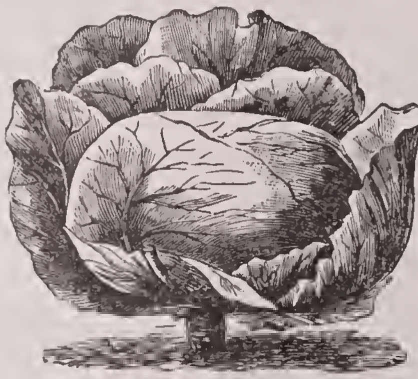


FIG. 4. *Large Flat Dutch.*

Third Early: Bloomsdale Brunswick, and *Fottler's Improved Early Brunswick* and the *Bloomsdale Early Drumhead* are the earliest of the large Drumheads; heads not very hard, but remarkably tender and rich.

Filderkraut. Solid and good.

Other varieties of some worth are the Early Curled Silesian, Valmorin's Early Flat Dutch, Henderson's Early Summer, Crane's Early, Early Wyman, Little Pixie, Bloomsdale Bullock Heart, Dutch Butterhead, Early Red Erfurth, Cannon-Ball (having an exceedingly solid head), etc.

Late: Bloomsdale Late Flat Dutch. Probably the best; includes the "Premium Flat Dutch." *Imperial*, or *White.* Excellent. *Marblehead Mammoth Drumhead.* The largest in the world. Better for cattle. *Marblehead Dutch.* Good.

Red Drumhead. Large; good for pickling; heads round, and under high cultivation very hard; reliable for heading.

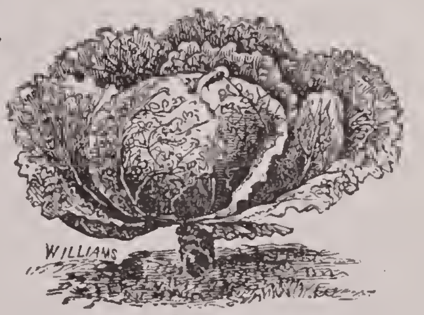


Fig. 5. *Drumhead Savoy.*

Large Late Drumhead. Best for sauer kraut.

Drumhead Savoy. Large and curled.

Green Curled Savoy. The very finest type of winter cabbage.

Improved American Savoy, Extra Curled. One of the best for winter; very finely curled; reliable for heading.

St. Dennis. A large late Drumhead with a solid head; popular in Canada.

Bergen Drumhead, *Stone-Mason Drumhead*, *Red Dutch* and a few other varieties are good, but quarter of what we have already given would be sufficient for any purpose.

Cabbage, To Prepare for the Table: Boiled. Take off the outer leaves, cut the head in quarters, and boil in a large quantity of water, until done. Drain and press out the water, chop fine and season. Boil three-quarters of an hour, or till tender. The water can be drained off when they are half done, and fresh water added if desired.

Another: Before cooking, cut the head in half and pour boiling water on it to prevent the disagreeable odor which arises from cooking. Cabbage is best boiled with the broth from salt meat, and is a nice accompaniment to corned beef. It requires an hour slow simmering, and must be skimmed constantly while cooking. If not cooked with salt meat broth, put some salt in the water.

Stewed. Shred the cabbage coarsely and parboil in fast boiling water for five minutes, then drain and add rich milk enough to cover. Cook until tender and season with butter rolled in flour, salt, and white or red pepper.

Cold Slaw. Shave the cabbage fine; scald half pint of vinegar, mix one small teaspoonful of corn-starch in two-thirds cupful of cream (or condensed milk a very little thinner), with one egg well beaten, and a little salt; pour the scalded vinegar on the mixture very slowly, so as not to break the egg, then boil until thick; pour hot on the cabbage; a few capers and olives will improve the slaw for those who are fond of such things. The above is a very nice dish to eat either with fried or scalloped oysters.

French Slaw. To one head of cabbage take eight hard-boiled eggs, rub the yolks with three-quarters cup melted butter, one and one-half tablespoonfuls of strong mustard, one-half tablespoonful of salt, same of black pepper, one teaspoonful of sugar. Cut cabbage as fine as you can on a cutter, then cut across with a knife; cut whites of eggs very fine, mix with the yolks, and add vinegar to moisten, like chicken salad.

Nice Dressing for Cabbage. Beat the yolks of two eggs, add one teaspoonful pure mustard, one teaspoonful salt, one tablespoonful butter, two tablespoonfuls cream, two tablespoonfuls white sugar, two-thirds cup of vinegar. Let it come to a boil, then pour over the slaw, lettuce or celery. Cut the cabbage fine; serve hot or cold. It will keep. Use one head of cabbage for above.

To Pickle Cabbage, or make "sauer kraut." Take nice sound cabbage, and chop it very fine in a wooden bowl with a chopping-knife; then put a thin layer of salt and black pepper (ground) in the bottom of a stone jar, then a layer of the chopped cabbage about one and one-half inches deep, then a little salt and pepper, alternating with the cabbage, until the jar is full; then cover with good strong vinegar; cover and keep in a cool place. It is very nice with meat and vegetables. It does not require much salt, and will keep for weeks.

Cabriolet (cab-ri-o-let′), a one-horse pleasure carriage with two seats, having a calash top and a covering for the legs and lap.

Cacao (ca-ca′o, or ca′co), the chocolate tree, growing in South America and the West Indies. Chocolate is made from its seeds.

Cache (cash), a hole in the ground, or hiding-place, for concealing and preserving provisions which it is inconvenient to carry.

Cactus, a juicy, herbaceous plant, generally without leaves, and thorny. The prickly pear is the most familiar example. The cactus has many grotesque forms, and some have gorgeous, lily-like flowers. Common as house plants.

They are very easy of cultivation, as the most of them may be regarded as half hardy in the Northern States. They are generally grown in pots, and are exposed to the out-door atmosphere, except in frosty weather. The night-blooming cereus is a homely twiner, which requires more care. Its value consists altogether in the singular large flower which it puts forth during an evening, to remain open but a few hours. These flowers are a source of a fine perfumery, to be had at the drug stores. The fruit of the prickly pear is liked by some as pickles, but has never been very popular. It grows wild in most sandy regions west of Indiana. A kind with smaller flowers and edible berries grows along the Atlantic coast.

Caddice, Caddis, Cadew, or **Cade-worm**, a kind of worm which is a favorite fish-bait.

Cafe (caf′ay), a coffee-house.

Caisson (ca′sn), a wooden box or frame of strong timbers, used for laying the foundations of a bridge in situations where the coffer dam cannot be employed. The word has also other meanings. The coffer dam is a water-tight enclosure or box of timber placed in the bed of a river, or some like position, for the purpose of excluding the water during the progress of some work, such as a wharf, or an abutment, or a pier. The water is pumped out of the enclosed space, leaving the bottom dry.

Cakes. A "cake," in general, consists of flour, sugar, butter, eggs, with yeast or milk and soda, and salt and spicing to taste. The thousands of recipes published for cakes amount only to the foregoing, with slight variations as to proportion; and it would seem that any person of ordinary judgment could make a cake to suit himself with no further directions than the mention of the above ingredients. To begin with, milk and sugar and egg constitute a rich dish of themselves, in all proportions. But, in order to secure fancy flavors and general success, many desire recipes, and we give many of them, alphabetically arranged as nearly as practicable.

GENERAL DIRECTIONS. An oven to bake well should have a regular heat throughout, but particularly at the bottom, without which bread or cakes will not rise or bake well. An earthen basin is best for beating eggs, or cake mixture. Cake should be beaten with a wooden spoon or spatula; butter may be beaten with the same. Eggs should be beaten with rods or a broad fork; a silver fork, or one made of iron wire, is best, as it is broadest. Eggs should be clear and fresh for a cake. It is well, as a general rule in cake-making, to beat the butter and sugar (which must be made fine) to a light cream; indeed, in the making of pound cake, the lightness of the article depends as much upon this as upon the eggs being well beaten; then beat the eggs and put them to the butter, and gradually add the flour and other ingredients, beating it all the time. A pound of pulverized sugar is three cupfuls; a pound of sifted flour five cupfuls. In common cakes, where only a few eggs are used, beat them until you can take a spoonful up clear from the strings.

In receipts in which milk is used as one ingredient, either sweet or sour may be used, but not a mixture of both. Sour milk makes a spongy, light cake; sweet milk makes a cake which cuts like pound cake. To blanch almonds, which are used in many cakes, pour boiling water on them and let them remain in it until their skins may be taken off; then throw the almonds into cold water to whiten them; drain the water from them, but do not wipe them; the moisture will prevent their oiling.

In making cakes, if you wish them to be pleasing to the palate, use double-refined sugar, although light brown sugar makes a very good cake. For icing cakes, the sugar must be rolled and sifted, or pounded in a mortar. To ascertain whether a cake is baked enough, if a small one, take a very fine splint of wood and run it through the thickest part; if not done enough, some of the dough, or unbaked cake, will be found sticking to it; if done, it will come out clean. If the cake is large, pass a small knife blade through it instead of the splint. Cakes to be kept fresh should be placed in a tin box, tightly covered, in a cool, dark place.

FILLING (to put between cakes). One egg, half-pint milk, half-cup sugar, one tablespoonful corn starch; scald together; make thick with grated cocoanut, or two-thirds cup of dessicated cocoanut soaked in the milk.

FROSTING FOR CAKE. Whites of eight eggs; two pounds of loaf sugar; half an ounce each of white starch and gum arabic, beaten till it looks white and thick; dry it in a cool oven. Or, take one cup of white sugar, add a very little water, and boil until it becomes a thick sirup. Just before it is done enough, beat the white of one egg to a froth, and pour the boiling sirup into it, beating it all the time. Continue to beat until it becomes very white and thick. Icing made in this way is very nice, and will not crackle or turn yellow.

Another: For one large cake use a pound of pulverized white sugar and the whites of two eggs; stir the sugar gradually into the whites; squeeze in the juice of half a lemon; stir well; put on one layer; let stand half an hour, then put on another. This makes a hard frosting.

Gelatine Frosting: One teaspoonful gelatine, two table spoonfuls of cold water; when the gelatine is soft, one tablespoonful of hot water. When entirely dissolved, add one cup of powdered sugar, and beat it while it is yet warm, until white and light; lemon to taste. This frosts one sheet of cake.

ALMOND CAKE. Take one cup of butter, one cup and a half of sugar, three eggs, half a cup of milk, two teaspoonfuls of baking powder, about two cups of flour; flavor with a little almond extract; blanch one pound of almonds; lay aside enough to cover the top of the cake when they are cut in halves; chop the rest and put into the cake. After the cake is in the tin, lay the split ones over the top of the cake; they will rise and brown as the cake bakes.

Another: Two cups sugar, one cup butter, one cup sweet milk, four cups flour, three eggs, three teaspoonfuls of baking powder; bake in layers as for jelly cake. Instead of jelly, use one coffee cup of thick sour jam, one tablespoonful extract vanilla, one pound almonds, blanched and chopped fine. Sugar to taste. Make rather sweet.

DRIED-APPLE CAKE. Stew two cups dried apples so as just to cut easily, and chop them fine as raisins, and boil them in two cups of molasses till preserved through. Then for the cake: drain the molasses from the apples and add to it one cup butter, two eggs, one cup sour milk, two teaspoons soda, four cups flour, and spice of all kinds; lastly, add the preserved apples.

BLACK CAKE. Two pounds of currants, two pounds of raisins (after washing both currants and raisins; when they are dry, dredge with flour), one large spoonful of ground cinnamon, one large spoonful of ground mace, four nutmegs, one gill of molasses, one gill of brandy, one gill of rose water, if you choose; sift one pound of flour into one pan, and one pound of sugar into another; add to the sugar three quarters of a pound of butter and stir to a cream; beat six eggs light and stir into the butter and sugar alternately with the flour, then add by degrees fruit, spice and liquors, and stir hard. Bake in a moderate oven about four hours; let it remain in the oven to cool.

BREAD CAKE. Three large teacups light dough, one teacup sugar, one-half cup butter, one egg, a small teaspoonful of saleratus dissolved in as little water as possible; spice to taste; have in a pan, and mix with the hand, as it cannot be done with a spoon; grease the pan or pans, leaving room to rise, and when very light, bake. If you wish the cake richer, add butter and sugar. Do not use the dough until light enough to bake.

Another: When you mold your bread in loaves reserve a small loaf, to which add one cup of raisins, one of fryings, one pint of sugar, one cup sour cream, three eggs, five teaspoons soda, one of cloves, one of cinnamon; mix well; add half a cup cold coffee, one nutmeg, and enough flour to mold in loaves. Set in warm place to rise, and bake one hour.

BREAKFAST CAKES, for warm weather. Take one cup of molasses, one cup of brown sugar, nearly one cup of butter, or lard and butter mixed, one cup of sour milk, four cups of flour, four teaspoonfuls of soda, not heaping but even full, one teaspoonful each of cinnamon, salt and ginger; one egg; bake in gem tins. These will keep well for a week.

Another: Take enough bread sponge to make, when risen and baked, a cake two inches thick; knead into it a piece of butter about the size of half an egg; after it is in the tin put on the top little lumps of butter and then cover it with fine white sugar and ground cinnamon; when baked there will be a sort of crust over the cake. This is very nice with coffee.

BRIDE CAKE. Beat two cups of sugar and three-fourths of a cup of butter to a cream. Beat three eggs, whites and yellows separately. Add the beaten yolks to the butter and sugar; beat well and then add three-fourths of a cup sweet milk; add the beaten whites; two teaspoonfuls baking powder mixed in three and a half cups of flour; add this to the other and mix well; beat very little; one teaspoonful soda, if sour milk is used in place of baking powder.

CHOCOLATE CAKE. Two cups of sugar, one-half cup of butter, whites of three eggs, one cup of milk, two and three-fourths cups of flour, three teaspoonfuls of baking powder; bake on jelly-tins. To the whites of two eggs, well beaten, with not quite a cup of pulverized sugar, add six tablespoonfuls of grated German sweet chocolate, and two teaspoonfuls of vanilla; spread on the cakes.

COCOANUT CAKE. Four cups of flour, three of sugar, one cup of milk, five eggs, beaten separately (save the whites of three for icing), one cup of butter, two teaspoonfuls of cream of tartar, one teaspoonful of soda, the half of a cocoanut grated and put into the cake, the other half put with the whites of three eggs and half a cup of powdered sugar, with a little orange water or lemon juice for the icing; bake the cake in jelly-pans; when done spread the icing between and on top; put in the oven for a few minutes.

Another: Three eggs, two cups sugar; one cup milk, two tablespoonfuls melted butter; mix together; three cups flour, two teaspoonfuls baking powder. Bake in sheets.

COCOANUT COOKIES. Two cups of sugar, one of butter, two eggs, half a grated cocoanut, with flour; roll thin and bake.

COCOANUT DULCIES. Grate half of a medium-sized fresh cocoanut, and add to this a quarter of a pound of pulverized sugar. Beat the whites of three eggs to a froth, and mix. If a little thin, add a dust or so of corn starch. Take a piece of writing paper, butter it and lay it in a pan. Take a spoonful of the mixture, and pour it around on the paper. Oven must not be too hot. Time to cook the dulcies, eight to ten minutes.

COFFEE CAKE, or "Kaffee Kuchen," requires one pound of risen dough ready for the oven, quarter pound of sugar, three ounces of butter, one egg. Cream the butter and beat it well with sugar and egg; add the dough and mix thoroughly with the hand and leave it in a warm place to rise. When light pour it in thinly over a pan (when baked it must not be more than two inches thick) and let it stand to rise for about ten or fifteen minutes in a warm place, then put it in the oven, and while it is baking prepare the icing. Have ready two dozen almonds previously blanched. Beat the whites of two eggs with enough fine sugar to stiffen them, putting the sugar in very gradually. Shred the almonds and stir them with the icing; spread all out over the loaf of cake, and leave it to dry in the mouth of the oven. If the almonds brown a little, it improves the icing. Cut for the cake plate in oblong slices.

Another: One cup sugar, two-thirds cup butter, one cup molasses, one cup raisins, one egg, one teaspoonful soda (level full) in one cup coffee to be added the last thing: add citron and currants and flour to make the right stiffness.

Another: One cup brown sugar, one cup molasses, one-half cup each butter and lard, one cup cold coffee, two eggs, one tablespoonful cinnamon, and one of cloves, one grated nutmeg, one teaspoonful soda, flour, one pound each of currants and raisins.

COOKIES. Rub to a cream three-quarters of a pound of butter and a pound of sugar; add three well-beaten eggs, two spoonfuls of caraway seed, a grated nutmeg and a pint of flour; stir in a teaspoonful of saleratus dissolved in a teacup of milk, and strained into half a teacup of cider; add flour to make the cookies stiff enough to roll out. As soon as cut into cakes, bake in a quick oven till of a light brown.

Another: Three eggs, two and a half cups sugar, one heaping cup of butter, not quite a cup of sour milk, a little nutmeg, one teaspoon soda, and one of baking powder, sifted in the flour.

Another: One cup of butter, two of sugar, two eggs, well beaten, one-half teaspoonful of soda in three tablespoonfuls of sweet milk; nutmeg to taste, and flour enough to roll out without sticking; roll thin and bake in a quick oven. Made in this way they will almost melt in your mouth. Some think cookies are best when ten days old, but can never keep them that long.

Ginger Cookies. One cup of sugar, one cup molasses, one cup of lard, two-thirds cup of boiling water, one egg, one teaspoonful cream of tartar, one tablespoonful ginger, one teaspoonful soda, one teaspoonful salt.

Molasses Cookies. Take' two cups of molasses, one cup of sugar, two cups of butter, four teaspoonfuls of alum, put in two cups of boiling water, four teaspoonfuls of soda and flour enough to roll out.

Composition Cake. One pound of flour, one cup of sugar, half a pound of butter, seven eggs, half a pint of cream.

Corn-Starch Cake. Half pound corn starch, half pound wheat flour, six eggs, half pound butter, one pound sugar, one small cup sweet milk, two teaspoonfuls baking powder.

Cream Cake. One cup sugar, two eggs, four tablespoonfuls boiling water, one scant rounding teaspoonful baking powder, one cup and a half of sifted flour. Beat sugar and eggs together, mix baking powder with the flour, and stir slowly in, putting the boiling water in last, a spoonful at a time. Bake in two or three tins. The cream for same is one-half pint milk, one-half teacup sugar, small piece of butter, one heaping tablespoonful of corn starch, one egg or none. Cook thoroughly. If egg is used, stir in just before taking from the fire. When nearly cold flavor with vanilla or lemon to taste and put between the layers.

Another: Two eggs, one and a quarter cups white sugar, eight tablespoons cold water, flour to make rather stiff, in which put two teaspoons baking powder. Bake in two pie pans. Cream for cake: Place two-thirds cup sweet milk in skillet on stove, to which add the following: two eggs, two-thirds cup sugar, one and one-half tablespoons of corn starch wet with a little milk; boil until thick, stirring all the time; empty into a bowl, add one tablespoonful of butter, one teaspoon extract of vanilla; split open your cakes, place the cream on them, and put the top back again.

Another: Three cups sugar, one of butter, and one of sweet cream, five eggs, four cups flour, two teaspoonfuls baking powder; beat well.

Another: Boil together half a pint of water and two-thirds of a cup of butter; while boiling stir in one and a half cups of flour thoroughly; let it then cool sufficiently not to cook the eggs, five of which are to be well beaten, and the whole mixed together; drop on tins a spoonful in a place, and bake in a very hot oven twenty or thirty minutes. It will make two dozen. For the cream boil a pint of new milk, stirring in beaten together two eggs with one cup of sugar, and not quite a cup of flour; boil a little, stirring briskly; when cool, flavor with lemon; open the cakes at the side with a sharp knife and pour in the cream.

Cup Cake. Nine cups of flour, four of sugar, two of butter, half a cup of milk, two spoonfuls of saleratus, eight eggs; spice to your liking.

Currant Cake. Put a pound of flour into a bowl, and with it a pinch of salt, and a large heaped teaspoonful of baking powder. Mix thoroughly. Rub in a quarter of a pound of good beef dripping, and add half a pound of currants picked and dried, a quarter of a pound of sugar, one ounce of citron peel thinly cut, and half a teaspoonful of grated lemon-rind. Make into a stiff paste with milk, and bake in a good oven.

White Delicate Cake. Three cups of sifted flour, one and a half cups of sugar, whites of seven eggs, one teacup of sweet milk, two tablespoonfuls of butter, two heaping teaspoonfuls baking powder, and teaspoonful extract of vanilla, almond or lemon. Beat the butter and sugar to a cream, add to it the milk and eggs well beaten, then add the extract. Mix with this very slowly three cups of flour, in which the baking powder has been well mixed. Bake in a quick oven. It makes a delicious cake for jelly, chocolate or cocoanut layers. If the latter is used, grate a large cocoanut, removing the brown skin first; then add to it the beaten white of one egg and one coffee cup of fine sugar. Stir it all together and spread between the layers of cake, icing the upper layer. This receipt will make three layers of cake and a plateful of small frosted cakes.

Delicate Cake. Whites of eight eggs, one cup of butter, two cups of white sugar, three cups of flour, two teaspoonfuls baking powder. Flavor with lemon or vanilla. Stir butter and sugar to a cream, add one cup sweet milk, and then the flour, adding the beaten whites last. This is excellent.

Drop Cakes. Mix half a cup of butter, one of sugar, a quarter of a cup of milk, half a cup of flour, two eggs, and a half a teaspoonful of baking powder into a batter: flavor with vanilla and beat until light. Butter dripping pans and drop in teaspoonfuls, leaving plenty of room between each.

Bake in a quick oven; they should be brown on the bottom, crisp around the edges, almost white on top, and extremely thin.

Another: One pound of flour, one pound of sugar, eight eggs, leaving out half of the whites; rose-water, and nutmeg to your taste.

ONE-EGG CAKE. One and one-third cups of flour, one-third cup of sweet milk, one cup of sugar, one tablespoonful of melted butter, one egg and two tablespoonfuls of baking powder.

AN "EGGLESS CAKE." A recipe for eggless cake may not come amiss when eggs are twenty cents or more per dozen: Two cups sugar, one-half cup butter, two cups milk, one cup raisins, four cups flour, one teaspoonful soda; spice to taste. All young housekeepers may not know that cake is very much nicer mixed with the hands, or frosting for cake is just as nice made without beating the egg at all. Just stir it stiff with sugar, and apply to your cake with a knife wet in cold water, and wet your knife occasionally all through the process of frosting the cake.

FEATHER CAKE. Two cups of sugar, one-half cup of butter, one cup of sweet milk, three cups of flour, three eggs, beaten separately, one teaspoonful of soda, and two of cream of tartar. Flavor with the rind of a fresh lemon. Bake in jelly-tins. It is also nice if baked in a loaf and frosted.

FIG CAKE. Two cups of sugar, one of butter, one of cold water, with a teaspoonful of soda dissolved in it, three cups of raisins, chopped fine, cinnamon and nutmeg, four eggs, one pound of figs; use the figs whole, covering them well with the cake to prevent burning. Bake in layers, frosting between each layer. Make as stiff as pound cake. Cut with a very sharp knife to prevent crumbling. This receipt makes two loaves.

FISH CAKES. One pint bowl salt codfish, picked very fine; two pint bowls of whole, raw, peeled potatoes; put together in cold water and boil till the potatoes are thoroughly cooked; remove from fire and drain off all the water; mash with potato-masher; add piece of butter the size of an egg, two well-beaten eggs, and a little pepper; mix well with a wooden spoon; have a frying-pan with boiling lard or drippings, into which drop a spoonful of mixture and fry brown; do not freshen the fish before boiling with potatoes, and do not mold cakes, but drop from spoon.

FRUIT CAKE. The material should be prepared a day or two before the cake is made, and put the cake together in the morning in order to have plenty of time. Have everything ready, even to the pans lined with paper, and well buttered, that you need not stop after you commence mixing the cake. Take three pounds each of flour, sugar, butter and raisins, six of currants, one of citron, two dozen eggs, one ounce each of mace, cloves, nutmeg, cinnamon, half a pint of brandy. To mix: Stir the butter with your hand to a cream, then beat the sugar into the butter, add the yolks of the eggs well beaten, then the whites beaten to a froth; mix the fruit, spice and flour together; then beat them in gradually; add the brandy last. The usual way of testing the cake with a smooth needle or straw is the best in this as other cases.

Another: One cup molasses, one pound flour, one of sugar, three-fourths of a pound of butter, two pounds of seeded raisins, three of currants, one of citron, half a pound of blanched almonds, half an ounce of mace, one wineglassful brandy, ten eggs; cream the sugar and butter, add the eggs, beaten separately; stir in the flour, brandy, spices, and then the fruit.

Another: Two cups of flour, two of sugar, one of butter, one of molasses, five eggs, one pound of currants, one pound of raisins, one teaspoonful of saleratus, one nutmeg, one teaspoonful of all kinds of spice. A little brandy improves it.

Another: Two eggs, one cup sugar, two-thirds cup butter, one cup fruits, half teaspoonful soda.

GINGER CAKE. One pint molasses, half-pint shortening, half teacup of water with tablespoonful of soda dissolved in it, two tablespoonfuls of ginger, two eggs; knead in flour to roll out easily; cut in squares size of soda crackers; with back of knife stripe them; bake in quick oven; soon as taken out frost slightly with icing; the dough can be prepared night before.

SOFT GINGER CAKE. One cup of molasses, one heaping teaspoonful of lard, one teaspoonful of ginger, one cup of buttermilk, one teaspoonful of soda, a pinch of salt. Flour enough to make a batter, and bake in flat pans.

SOFT GINGERBREAD. One and one-half cups sorghum molasses, two eggs, one cup of sour cream, one teaspoonful of soda, one spoonful of ginger and a pinch of salt. Stir about as thick as any stirred cake.

Another: One tablespoonful butter, one tablespoonful ginger, one-half cup brown sugar, two cups molasses, two cups water or sour milk, one and a half teaspoonfuls soda; do not stir very long; bake in a moderate oven.

OLD FASHIONED GINGERBREAD. Take four quarts of sifted flour, one quart of molasses, one tablespoonful of soda; dissolve in as little water as possible; add to molasses one tablespoonful of ginger and one-half pound of butter, and last, one tablespoonful of alum dissolved in half a teacupful of boiling water; mix as soft as can be rolled, and cut in cards. It will keep for months.

GRANDMOTHER'S GINGERBREAD. Take one pint of molasses, eight tablespoonfuls of shortening, one teaspoonful of soda, a small tablespoonful of ginger, and a little salt if you do not use butter for shortening; roll it in strips four inches wide and mark it off with a knife.

MOTHER'S GINGERBREAD. One cup of butter, one of brown sugar, one of sour cream, two of molasses, one tablespoonful soda dissolved in boiling water; spice to taste; flour to roll out as thin as possible.

EXCELLENT GINGER SNAPS. Put into a tin pan two cups of molasses, one cup brown sugar, two-thirds of a cup of lard, one tablespoonful ground ginger. Put the tin on the stove, and let it boil until they thicken a little, then add a heaping tablespoonful of soda, dissolved in one-half cup of tepid water; mix thoroughly before taking from the stove; then add flour enough to make pretty stiff dough. Roll very thin. Cut with a large tin (as they "shrink" a good deal), and bake in a quick oven. These are as good as you get in the bake-shop.

Another: Work a quarter of a pound of butter into a pound of fine flour, then mix it with a half pound of molasses, a quarter of a pound brown sugar, and one tablespoonful each of ginger and caraway seeds. Work it all well together, and form it into cakes not larger than a dollar piece; place them on a baking tin in a moderate oven, when they will be dry and crisp.

Another: One teacup molasses, half a cup brown sugar, two-thirds cup lard or butter, half a cup sour milk, tablespoonful ginger, two teaspoonfuls soda.

GINGER JUMBLES. Molasses, three pounds; sugar, one pound; ginger, one and a half ounces; butter, half pound, rubbed in two pounds of flour; put in small lots on tins and bake.

GINGERBREAD NUTS. One pound of sugar, two pounds of molasses, three-quarters of a pound of butter, four pounds of flour, four ounces of ginger, one ounce of allspice, two spoonfuls of coriander seed, some candied orange peel, two spoonfuls of brandy, yolks of four eggs. Mix the sugar, molasses and butter, and melt all together, then stir in the flour, ground ginger, allspice, coriander seed, and the orange peel, cut very small. Mix all into a paste with the eggs well beaten, and the brandy, and make them into nuts or cakes.

HICKORY-NUT CAKE. Two cups sugar, one of milk, two-thirds cup of butter, three of flour, three eggs, two teaspoonfuls baking powder, one cup nut kernels cut fine.

ICE CAKE. Ten eggs, one pound sugar, half a pound of flour, two lemons. Beat whites and yolks separately; add to all the yolks and whites of seven eggs the sugar, the rind of two lemons, and juice of one. Bake as for jelly-cake. To the whites of three eggs allow a pound and a quarter of powdered sugar; beat stiff as for icing, take out enough to cover the top of the cake, and set aside. Add to the rest the juice and half the grated peel of a large orange. When the cake is nearly cold, spread this between the layers. Beat into the icing reserved for the top a little lemon juice, and, if needed, more sugar. It should be stiffer than that spread between the cakes.

JELLY CAKE. Beat three eggs well, the whites and yolks separately; take a cup of fine white sugar and beat well with the yolks, and a cupful of sifted flour stirred in gently; then stir in the whites, a little at a time, a teaspoonful of baking powder and one tablespoonful of milk; pour it in three jelly-cake plates, and bake from five to ten minutes in a well-heated oven, and when cold spread with currant jelly, and place each layer on top of the other and sift powdered sugar on the top.

ROLL JELLY CAKE. One cup of white sugar, half a teacupful of sweet milk, two eggs, one cup of flour, one teaspoonful of cream of tartar, one-fourth teaspoonful saleratus, a pinch of salt. This will make two cakes in a square tin. Have the oven ready, put the cakes in, and while they are baking get a cloth and the jelly ready for the table. As soon as they are baked, take them out, and turn them one at a time on the cloth; spread quickly with jelly or marmalade, and roll up tightly in the cloth, and lay them where they will cool. Handle them carefully or they may fall. Cut them in slices with a sharp knife. This will be as nice jelly cake as you will want to eat, and will not taste of eggs. You can flavor them with anything you like, if you choose to do so. You can also bake one cake at a time; it will not hurt the mixture to stand.

SNOW JELLY CAKE. Beat two eggs in a teacup and fill up with rich, sour cream; one teacup of white sugar, one cup of flour, a little soda; not quite half a teaspoonful unless the cream is very sour. Bake in four round tins and brown as little as possible. Have a jelly prepared by soaking four tablespoonfuls of tapioca in warm water until transparent, then add more water and place your dish in boiling water on the stove and cook until a transparent jelly; flavor strong with lemon, almond, or wintergreen. Gelatine is just as nice as tapioca. This cake is not expensive and is very nice and can be eaten by dyspeptics.

JUMBLES. Take four eggs, three cups of sugar, a little nutmeg, a teaspoonful of saleratus, a cup of butter. Stir in the flour till it will roll; cut it in rounds with a hole in the center. Roll them in sugar.

LEMON CAKE. Three cups of sugar, five eggs, three-fourths cup butter; beat together. Add one-half cup of sweet milk, two teaspoonfuls of cream tartar, one teaspoonful of soda; dissolve in a little water; juice and rind of one lemon grated, and flour to mix. Bake slow. This makes a large cake, and enough for two layers of jelly cake.

LEMON CHEESE-CAKES. Just warm a quarter of a pound of butter, stir into it a quarter of a pound of sugar pounded fine, and when dissolved mix with it the peel of two lemons grated and the juice of one strained. Mix all well together, and pour it into patty-pans lined with puff paste. Put a few blanched almonds on the top of each.

LEMON PUFFS. Beat and sift a pound and a quarter of loaf sugar, and mix with it the peel of two lemons grated; whisk the whites of three eggs to a firm froth, add it gradually to the sugar and lemon, and beat it all together for one hour. Make it up into any shape you please, place the puffs on oiled paper on a tin, put them in a moderate oven and bake.

LOAF CAKE. Take two pounds of flour, half a pound of sugar, a quarter of a pound of butter, three eggs, one gill of milk, one-half teacupful of sweet yeast; cloves and nutmegs for spice.

FRENCH LOAF CAKE. Two cups of white sugar, one scant cup of butter, one cup of sweet milk, three heaping cups of flour, three eggs, two teaspoonfuls cream of tartar, one teaspoonful soda. Put sugar, butter, eggs (not previously beaten), soda, and cream of tartar all together; beat to a froth; add the milk, beating well; flavor with lemon extract; add the flour gradually; pour into a cake tin lined with buttered paper; sprinkle a little powdered sugar over the cake before baking. It is well to cover it when first putting in the oven, in order not to harden the top too soon.

CHOCOLATE MACAROONS. Beat the whites of two eggs to a stiff froth. Add gradually eight tablespoonfuls of powdered sugar, and when well mixed sift in half a teaspoonful of baking powder mixed with two tablespoonfuls of corn-starch or flour, and four tablespoonfuls of grated chocolate. Drop on buttered paper and bake in a moderate oven until well done.

MARBLE CAKE. White part: Whites of four eggs, one cup white sugar, half cup of butter, half cup of sweet milk, two teaspoonfuls of baking powder, one teaspoonful of vanilla or lemon, and two and a half cups of sifted flour. Black part: Yolks of four eggs, one cup brown sugar, half cup molasses, half cup butter, half cup sour milk, one teaspoonful cloves, one teaspoonful cinnamon, one teaspoonful mace, one nutmeg, one teaspoonful soda, and one and a half cups sifted flour. Put it in the cake dish alternately, first one part and then the other. The tin should be lined with buttered paper.

MOLASSES CAKE. Two cupfuls of molasses, one cupful of lard, three-quarters of a cupful of water, one tablespoonful of ginger, three teaspoonfuls of saleratus dissolved, flour enough to make it as stiff as pound cake dough.

PLUM CAKE. One pound of dry flour, one pound of sweet butter, one pound of sugar, twelve eggs, two pounds of raisins (the Sultana raisins are the best), two pounds of currants. As much spice as you please. A glass of wine, one of brandy, and a pound of citron. Mix the butter and sugar as for pound cake. Sift the spice and beat the eggs very light. Put in the fruit last, stirring it in gradually. It should be well floured. If necessary, add more flour after the fruit is in. Butter sheets of paper, and line the inside of one large pan, or two smaller ones. Lay in some slices of citron, then a layer of the mixture, then of the citron, and so on till the pan is full. This cake requires a tolerably hot and steady oven, and will need baking four or five hours, according to its thickness. It will be better to let it cool gradually in the oven. Ice it when thoroughly cold.

POUND CAKE. One pound of flour, one pound of sugar, one pound of butter, ten eggs, rose water and nutmegs.

RAISED CAKE. Three cups of new milk, one cup of yeast, two cups of sugar; work it into a stiff batter in flour; let it rise over night; in the morning put in one and a half cups of butter, one more cup of sugar, one teaspoonful of soda dissolved in milk; put in spices and raisins as long as you can stir it with a spoon.

RAISIN CAKE. Put ten ounces of flour into a bowl, and add a small pinch of salt and two teaspoonfuls of baking powder. Rub in four ounces of butter or clarified dripping, and then add two ounces of moist sugar, four ounces of Sultanas, an ounce of candied peel, a teaspoonful of grated lemon-rind, one egg, and milk to make a stiff paste.

Another: Two-thirds of a cup of butter and one and a half of sugar, two-thirds of a cup of milk, three of flour, one of chopped raisins, three eggs, a teaspoonful and a half of baking powder. Bake in sheets in a quick oven.

RICE CAKE. Put half a pound of rice to soak over night; boil very soft in the morning, drain off the water, mix it with four ounces of melted butter, and set it away to cool. When cold stir it into a quart of milk, adding a little salt; then stir in, alternately, six eggs, and half a pint of sifted flour. Beat all well together, and bake on the griddle in cakes about the size of a small dessert plate. Butter and send them to the table hot. Instead of preparing the rice, cold boiled rice makes very nice cakes, mixed and cooked as the prepared.

SHORT CAKE. When the dough is ready to be rolled, cut it in two parts; roll one-half of it the proper size, put it in the tin and spread butter over the top, then roll out the other half and lay on. When the cake is baked, the top layer is easily lifted off, and there is no danger of its falling, as sometimes happens when a cold knife is used to cut it. Delicious shortcakes may be made with blackberries, peaches, oranges and pine-apples chopped fine, as well as with the time-honored strawberry.

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SNOW-BALL CAKE. Whites of three eggs, one cup white sugar, one-half cup butter, teaspoonful soda; stir thick, and bake in small tins.

SOUR-MILK CAKE. One cup of sour milk, one cup of sugar, one-half cup of butter, two cups of flour, one egg, one level teaspoonful of soda, half cup of raisins, chopped, and spiced to taste.

SPONGE CAKE. Three eggs, one cup sugar, one cup flour, one heaping teaspoonful baking powder, four tablespoonfuls boiling water. Break the eggs into the mixing dish, beat till light; stir in the sugar; sift the flour and stir the baking powder thoroughly through it, and mix gradually into the sugar and eggs, then add the boiling water, a spoonful at a time; add a little salt, flavor to taste and bake in a moderate oven. The same recipe baked in a large dripping pan and spread with jell, makes a nice roll jell cake. Turn out on a cloth and roll it with the cloth under it to keep it from breaking.

CHEAP SPONGE CAKE. Four eggs, three cups of sugar, one cup of milk, one teaspoonful of saleratus, flour enough to make a good stiff batter, a little salt and spice; quick oven. Bake it twenty minutes.

TEA CAKE. Take four cups of flour, three of sugar, one of butter, three eggs, one cup of milk, one spoonful of saleratus.

WAFERS. One pound of flour, quarter of a pound of butter, two eggs beaten, one glass preserved quince juice, and a nutmeg.

FRIED WAFERS. Two eggs, two large spoonfuls of sugar, one nutmeg, flour enough to knead up hard; roll thin.

WAFFLES. Beat carefully into one quart of flour one quart of sweet milk, one cup of melted butter, half a teaspoonful of salt, and a scant half cup of good home-made yeast. When raised, add two eggs well beaten, and let the batter rise half an hour longer. Bake as soon as light in hot, greased waffle-irons.

RICE WAFFLES. A pint bowl of cold boiled rice, thin it with cold milk, one well beaten egg, a small piece of butter, and flour to make a batter stiff enough to bake.

WEDDING CAKE. One pound of butter, one pound of sugar, nine eggs, one pound of flour, three pounds of currants, two pounds of stoned raisins, one-half teacup of wine or brandy, from one-half to three-quarters of a pound of citron, one grated nutmeg, some mace and cinnamon. Rub the butter and sugar together; when light, add first the yolks and then the whites of the eggs,—the yolks and whites of the eggs to be beaten separately,—then put in nearly all your flour, keeping out just enough to dust your raisins and cement them; cut your citron in such slices as you like, and put in as you put the cake in the pan; after mixing your fruit in the cake, grease a four-quart pan carefully, line it with clean straw paper, a little butter on the paper; put your cake in and bake, in not too quick an oven, for it burns easily. After it is baked take it out of the pan, paper and all, and let it cool. The next day, to keep it fresh and moist, put it back in the pan, or in a tin cake-box, and keep it tightly covered.

Calash, a light carriage with low wheels, having a top or hood that can be raised or lowered, seats for four inside, a separate seat for the driver, and often a movable front, so that it can be used either as an open or close carriage; also, a carriage top which can be easily thrown back.

Calcimining. To put two coats on a room 12 by 15 feet, get five pounds of Spanish whiting and one-half pound of white glue. Some prefer Paris white (zinc white). Pour a pint of boiling water on the glue, and set in a warm place, stirring frequently till it dissolves. The glue will soak in an hour, or it can be soaked over night. Mix the whiting to a cream with warm water, and add the glue, stirring well. If too thick to spread easily, thin with water. Now try a little on the wall, and if it rubs off when dry, add more dissolved glue; but the above amount will make it stick if the glue is good. Shade with any dry color. Some use one-fourth pound of blue, and it makes French gray.

To make white, put in ultramarine blue; take enough to make it about three shades on the blue; mix it well with water, then strain into your calcimine; try it on some wall, and let it dry, and see if it is the right shade. The trouble with calcimine, it is often put on too thick, causing it to scale off. To make a job, one must put on three coats. Making drab, burnt amber, dry; buff, chrome yellow; stone, raw amber and blue; peachblow, chrome yellow and red, dry; lavender, blue and red; crimson, rose-pink; mix with water and strain through fine cloth. Sweep the walls thoroughly with a stiff broom, and scrape grease spots, and fill all cracks or holes with whiting, made into putty with water, and allow time for the mending to harden. If the walls are very dirty wash them first with a half pound of glue dissolved in a gallon of water, and then apply the calcimine with a whitewash brush. Put on the ceiling first, always passing the brush in the same direction, say north and south. In putting on the second coat, pass the brush east and west, and your ceiling will not be streaked. In doing the walls go around for the first coat and up and down for the second.

If the walls have been previously whitewashed, wash them first with solution of two ounces of white vitriol in two gallons of water. Ceilings that look rough and are inclined to peel, should be washed with a solution of one ounce of alum in one quart of water.

Calcine (cal-sine', or cal'sin), to reduce to a powder or brittle state by heating; or, to expel some volatile matter from, as carbonic acid from limestone; to oxidize.

Calculus (cal'cu-lus) is sometimes found in the excretory canals and other reservoirs of a human or animal body. They are solid, hard concretions, like stones in appearance. The remedy consists of almost any alkaline substance, especially the popular diuretics, as soda and carbonate of potash. Thorough, scientific treatment, however, requires the services of a skillful, conscientious physician.

Calipers (cal'i-pers), or **Caliper Compasses**, are compasses with curved legs, for measuring the caliber, or diameter, of round bodies.

Call-bird, a bird taught to allure others into a snare.

Call Loan, money lent by a banker or other person, secured by the deposit of stocks, bonds or other marketable securities, to be repaid when called for. A failure to repay within 24 hours after due is regarded as authority to the lender to sell the securities in his possession.

Callous, hardened, as flesh.

Callus, new growth over the end of a cutting, in plants.

Calves. The feeding and care of calves are matters which are often left to the calves themselves and their dams. One of the essentials of beginning a good breed, however, is the proper care of young calves. When the calf is permitted to run with the cow for a few months, and then left to take its chances for food on the pastures with other cattle, a runt is often the result, and it will remain a runt, even if it be of the largest and best breed. There is no food so good as mother's milk to develop a calf, and if really excellent stock is to be raised, the calf should be allowed to run with the mother for three months at least. But now, in the older States, milk has become so valuable that few stock-raisers can afford to give up the profits of the milking season for the benefit of the calf. An artificial method of feeding has therefore to be adopted. Food should be given the calf that most resembles the mother's milk. At first warm new milk should be used, and this should be continued until the calf is fully taught to drink. The calf can be taken from the cow when it is a week or ten days old, and can be taught to drink by inserting the finger into the mouth, wetting the nose with milk, and dropping the hand into it. Thus the calf will continue to suck the finger, and gradually learn to draw in the milk and swallow it. If the calf is obstinate and impetuous, and is inclined to butt, hold its head firmly, pressing it gently into the vessel so that its nose shall constantly touch the milk, but not so deeply as to strangle the calf. A little patience will, after a day or two, do the work; but occasionally a calf is so obstinate as to render it almost impossible to teach it to drink, and some will even pine and die before they will drink anything but mother's milk. Such are not worth the trouble of raising. After the calf has been thoroughly taught to drink, skim-milk can be gradually substituted for new; this should be made more nutritious by the addition of shorts or coarse wheat flour, scalded, flax-seed meal, or oat or corn meal, treated in the same manner. Great care should be taken to keep the animal dry and warm, and it should be fed three or four times a day. When it is a month or six weeks old it can be turned out to pasture, but separated from the older cattle; but it should always be confined under shelter of nights and stormy days. Feeding twice a day will now be sufficient. When it is three months of age the calf should be taught to rely on the solid foods, and at four months the milk can be discontinued entirely, though the longer the milk is continued the thriftier will be the growth of the calf. It should be faithfully watered. Calves take readily to thickened milk in the summer months, and devour it with avidity. When they are two to three months old they are often allowed to drink whey, but this is not a valuable food for calves, and they should never be forced to live on it exclusively. The stock-raiser should constantly aim to give the growing animal all the well-adapted, nutritious food it will take with a relish, always remembering that to make stock-raising profitable the animal should be brought to the earliest possible maturity. The practice of "deaconing" calves is large at the East, where dairy products are high, and the food supply scant and hard to be obtained. "Deaconing" is killing the calf as soon as the cow's udder is sufficiently drawn down as to reduce inflammation and prevent caking. This is done so that the dairymen can have an immediate use of the cow's milk for dairy purposes or for sale, and is thought to be more profitable than raising the calves. But in the West, even in the dairy districts of Illinois, Wisconsin and Iowa, this is not much practiced, the abundance and cheapness of forage crops and grain feed being such that it is thought more profitable to rear the calves, especially those that promise to make good dairy stock. The first winter of a calf's life is its critical period. It is the time of severe weather and change of food, and a time when shiftless farmers abandon the calves to the inclemencies of the season and a make-shift way of procuring their food about stacks, among the larger cattle in the yard, and oblige them to seek shelter in the same vagrant fashion. The result is that the best calves run down in flesh, become hide-bound and grubby, and often, toward spring, die of sheer neglect. The opposite method should be practiced. First, calves in winter should be warmly housed, but with ample ventilation. Their sheds or stables should never be damp, close or stuffy, and they should be carefully cleaned each day. Besides plenty of hay they should have other food, like a mixture of corn meal, oats, oil-meal, etc.; but more essential than all is the feeding of roots during the winter. Calves, unless rightly fed, are apt to become constipated in the cold season. This can be prevented by a liberal feeding of roots. For this purpose carrots are the best, though beets, turnips and potatoes can be used. The object should always be a healthy, full feed in the treatment of young animals, and an avoidance of permitting them to run down and stop growing. In this way only can profit be secured in raising calves.

DISEASES. The best medicine for the young calf is the first milk of the cow, which it should always be permitted to take. Bleeding at the navel may be safely stopped by tying a string around the cord hanging from it.

Diarrhœa is the disease most dangerous to calves. It is brought on by neglect, exposure, over and under feeding. The first thing to do is to remove the acidity of the stomach. Ounce doses of rhubarb and magnesia may be given with the milk. Two ounces of Epsom salts or two ounces of castor oil will often succeed. Follow with a light astringent. Prepared chalk, two drams, or magnesia one ounce, powdered opium ten grains, powdered catechu half a dram, tincture of capsicum two drams, essence of peppermint five drops. Mix and administer twice daily in milk or gruel.

CASTRATION. When the bull calves are three weeks old, if in good health, they should be castrated. It should certainly be done before they are four weeks old. Many of the best stock-raisers incline to the opinion that as soon as the calf begins fairly to gain size and flesh, say at two weeks old, is the proper time. Every person who purposes to breed cattle should know how to do this. The operation is quite simple, and easily performed.

Secure the calf so it may remain standing on its feet, but cannot struggle severely. Have a knife ready with a keen-edged blade. The blade of a budding-knife is the proper shape. Seize the scrotum from behind, and with two light, swift, sharp strokes cut through and into the testicle. Separate the membrane where it unites, pull the testicle out until the cord shows from four to six inches, and cut it with a pair of nippers or rather dull shears. It will save loss of blood. So operate with the other, and the work is done. If from any cause severe bleeding ensues, inject a little tincture of muriate of iron into the cavities, and wet a soft rag with the tincture and press it well into the cavity. If these be not at hand, push a little salt and lard into the cavity. If the operation has been carefully performed, nothing will generally be required. The calf should be kept free from interference by other animals until the parts are healed, which will usually occur in a week. If they have been used to the company of other calves, they should not be deprived of it now, else they will pine. One reason why we advise early gelding is, it should be done before the calf is taken off of new milk, and it should not be deprived of the natural milk until it recovers from the shock. Care must be taken that flies do not get near, to deposit their eggs in the parts operated on. To prevent this, if there are flies, keep the calves in a pretty dark, but well ventilated, place. Most persons will find it awkward at first to geld as we have directed. A little practice, however, with tact and firmness, will render all easy, especially if one can have the advantage of seeing an expert operate once. If suppuration ensues, recourse must be had to mild palliative measures. Keep the parts washed clean, twice a day, with warm rainwater and castile soap, and inject a small quantity of tincture of aloes and myrrh. If the parts become unhealthy or ulcerated (for mere suppuration is healthy action), wash with a weak and clear solution of sal soda, or hard-wood ashes. If proud flesh should arise (a rare occurrence), burnt alum, pounded very fine, may be applied, or the parts may be touched with lunar caustic.

Calyx, the leaf-cup of the flower. The calyx of an apple or pear is the blossom end, which is opposite the stem or stalk end.

Cam, the projecting part of an eccentric or wavy wheel, to produce alternate or reciprocating motion.

Cambium, the viscid secretion between the growing wood and inner bark. It is plant nutriment, forming into new tissue, both of wood and bark.

Camphor (cam′fur), an odoriferous gum, of value in medicines, household art, etc. When one swallows too much of this drug by mistake, he will have giddiness, faintness, nausea, vomiting, stupor, and if the dose was large enough, he will finally suffer delirium and death. He should take large emetics of warm water, tickling the throat with a feather, etc. He should also have ammonia applied to the nose, have cold water dashed over the chest, and take 40 drops of sal volatile in strong coffee every half hour, and be kept awake by two persons walking him between them constantly.

Camping. Living out of doors, with covered wagons or tents, is always characteristic of frontier life, and in the older sections of the United States, an occasional trip by covered wagon is still made, often more for pleasure and romance than for saving expenses; and camping out is and probably always will be practiced by hunters and fishermen in all parts of the country. After one has had some experience in such life, especially if he has sense and energy enough to improve in methods and conveniences, he will receive many valuable ideas. We have space here for only general directions.

For wagon cover, oiled cloth is necessary only for very long journeys or protracted life in camp. Unpainted or unoiled ducking, or even stout muslin, will sufficiently protect against most storms. Wagon bows, and indeed all the rigging about the wagon and harness, should be made very secure before starting on the journey, for breakages on the road cause most vexatious delays, annoyances, and sometimes considerable expense. The old-time feed-trough, attached to the rear of the wagon box, is particularly difficult to manage. It should be both light and strong, with hoop-iron nailed on the upper edge all around, or else there will be trouble. Suspended, as it has to be, it cannot with safety be loaded with heavy articles. When there is room inside the wagon bed for a couple of feed-boxes (being one small one for each horse), it is better to carry such boxes, and to carry them in that way, than to have a suspended feed-box on the outside. As to the essentials of good wagoning, see article Wagon.

In the care of the team, besides what may be learned from the articles Horse, Harness, Bridle, Check Ease and Rein, etc., we will add here that, as it is often difficult to obtain hay or fodder, a feed of green brush is a good substitute; and not only so, such feed should be given a horse, under all circumstances, two or three times a week,—all he will eat. Oak, hickory, bass-wood, ash, maple and beech are all proper. On the road, horses should be fed three times a day and offered water from four to six times. For nearly all long journeys the horses should be sharp shod. Watch their motion the first day's travel after shoeing, and if any limping is noticed, ascertain which shoe it is that "pinches," and have a blacksmith re-set it. In hitching the horses at night particular care is required. Never hitch to saplings except in such a manner that the animal cannot wind himself up by going around it. The sapling should be so near other trees or some other object that the horse cannot go around it, or a cross bar from it to another tree should be nailed or tied up. It is generally unsafe to tie to dead saplings. Tying to a straight, smooth board fence is safe. In hitching to a rail fence, always select the inner corner,—that is, the corner further from you as you approach the fence.

Camping grounds on the road are generally selected from an eighth to a quarter of a mile from some occupied dwelling, if practicable, so as to be conveniently near for obtaining favors or supplies, and yet not so near as to molest the residents. At those times of the year when mosquitoes are troublesome, it is well to take along some drugged solution to rub over the hands and face, to keep them off. It is difficult to manage netting satisfactorily on such trips.

As to diet, one wants less of the condiments with him than anywhere else, as his out-door life gives him a good appetite for plain food, and condiments create a preternatural thirst and endanger the health in almost every way. Sugar and molasses had better be dispensed with almost altogether.

Apparatus for cooking is a source of much anxious thought. Coal-oil or kerosene stoves, made purposely, are a great convenience, especially in a prairie country; but, taking all things into consideration, the old-fashioned pot, the skillet or frying-pan and a coffee-pot, to be used over a common wood fire on the ground, are the most satisfactory. Glass and earthen ware should not be taken along. Folding sheet-iron stoves have been invented, and when a good one can be obtained it would be advisable to purchase one. In rainy weather the party will of course take the precaution to keep constantly on hand in the wagon dry kindling enough at least to start one fire, as they may have to stop at night where it is difficult to obtain dry wood.

A very important element of the outfit is a box with shelves or partitions in it, to serve as a cupboard and larder, and it should be kept in the hind end of the wagon, convenient of access to one who stands on the ground. In stopping for camp, the hind-gate is usually taken out and this "cupboard" box easily slid out and set on the ground. No rank, stale meat should be allowed in this box, as it would taint everything kept there. Considerable skill is required to so arrange this box and its contents that the different articles of food will not spill out.

Canada Thistle: see Thistle.

Canary Birds, to Clear of Lice: see Bird.

Cancer, a corroding ulcer, having a core which consists of a central body and branches, similar in outline to that of a crab (Latin, *cancer*): hence the name. It comes from an incurable constitutional disease. The secret of the cancer doctor's "success" consists in his curing other sores, which are not really cancers. Said one of them to us, "confidentially," "I know a cancer when I see it; I give it some other name than cancer, and do not undertake to cure it." Good physicians, doubtless, often mitigate the sufferings of the patient and prolong his life. This is the best advice which can be given by the medical profession at the present day. Anodyne poultices, salves, liniments, etc., may be applied in home treatment, and a surgeon may extract the cancer once or twice, but all these things give but temporary relief. It is well, however, to have the case in charge of a doctor, if for nothing but to keep the patient from injuring himself by injudicious treatment.

Candles. Candle-wicking is so cheap at the present day that no farmer wants to manufacture any for home use. In order to make candles in molds, which are far better than dip candles, first secure the wicking in the center of each mold by looping one end over a stick across the larger end and tying knots just exterior to the smaller end. The end of the wick at the smaller end of the molds has to be drawn through by a hooked wire. Pour the melted tallow in, and after it has become cool, warm the mold just enough to allow the candles to slide out easily, when they all can be readily withdrawn at once.

Dip candles are made by looping a number of separate wicks over a rod and dipping them into melted tallow until the required thickness is attained, allowing the tallow which adheres after each dipping to cool before dipping again. Before the second dip, it is well to lay the wicks on a flat surface and straighten them, and fix a suitable contrivance for holding the rods while drying between the dips.

A good tallow for candles consists of about ⅓ beef and ⅔ mutton suet. If required for summer use, it will be improved by hardening, as follows: Put a little bees-wax with the tallow, especially if dark and not fit to sell; put into a suitable kettle, adding *weak* lye, and gently boil, an hour or two each day for two days, stirring and skimming well; each morning cutting it out and scraping off the bottom which is soft, adding fresh lye (be sure it is not too strong), 1, or 2, or 3 gallons, according to the amount of tallow. The third morning use water in which alum and saltpeter are dissolved, at the rate of 1 pound each for 30 pounds of tallow; then simmer, stir, and skim again; let cool, and you can take it off the water for use. They may be dipped or run in molds. For dipping, allow two pounds for each dozen candles. Or, dissolve 1 pound of alum in water, and stir in 5 pounds of tallow, and melt them together.

To make lard candles, to every 8 pounds of lard add 1 ounce of nitric acid. Weigh the lard and place it over a slow fire and just melt it; then add the acid, and it is ready to mold. A little bees-wax will improve it. Tallow can be hardened with resin, ½ pound of the latter to each pound of the former.

Candy, a preparation of sugar, partially crystallized and generally flavored or spiced. Dissolved sugar or molasses, boiled only to such an extent that when drawn out it forms fine threads, which crystallize and break, is said to be of "weak candy" height; boiled a little more, so that it will draw out into a larger string, and bladders can be blown through the drippings from the ladle, it is called "bloom sugar;" boiled still more, until it can be dashed off into a feathery form, it is called "feathered sugar;" still more, when a portion of it on a stick dipped into cold water will harden and crackle, it is called "crackled sugar;" and lastly, when thus dipping it into cold water it will snap like glass as soon as it strikes the water, it is "full candy" height, and is called "caramel sugar."

Instead of being unwholesome or injurious, a pure candy supplies not only a pleasant but essential element of food. It is only when it is made the vehicle for carrying into the stomachs of the young insidious poisons that its use should be condemned. Cane sugar, when absolutely pure, is one of the most wholesome dietetic articles known to biological science. The "'lasses" candy made on the farm, if made from pure cane sugar, is beneficial instead of detrimental. The best and safest articles to color with, are: for red color, cochineal, carmine and Brazil wood; for purple colors, madder purple, logwood and indigo; for blue colors, indigo and litmus; for green colors, sap green, yellow lake (or French berries) and indigo, etc.

ADULTERATION. "Store" candies are adulterated in a thousand different ways, many of them actually poisonous. Glucose is abundantly used for pure cane sugar, but the greatest danger is in colored candies. Not being able to determine the article by which candies are colored, it is, perhaps, the best not to permit the child to buy them; neither should the confectioner be permitted to wrap his candies in colored paper, for the child is liable to get it into the mouth and swallow it and become poisoned.

To make common sugar candy at home, to two pounds of C or common white sugar add enough water to reduce it to a sirup; add, after having dissolved it, one-half teaspoon cream tartar and lump tartaric acid size of a marrowfat pea or small bullet. Boil in a brass vessel, if convenient; if not, copper, which is better, or tin, but never use an iron vessel; be very careful not to scorch it; boil until brittle, when put in water; pour into a greased tin pan or cooler, and flavor to suit the taste. This should be immediately well pulled, in order to give it a white, silvery-like appearance. Handle with buttered fingers. It helps the candy much to separate a batch into two parts, and, after having pulled one till white, to color the other with extract of raspberry or any harmless colored flavoring, and pull and mix, giving it a streaked appearance.

Or, take one cup of sugar and one cup of sweet cream; boil it till it is of a light brown color, then pour it into a buttered dish.

To make molasses candy, take 1 quart molasses, 1½ pounds brown sugar, the juice of a large lemon; mix the molasses and sugar together, butter the inside of a kettle and put it in. Let it boil over a moderate fire for 2 hours, then add the lemon juice and boil ½ hour; stir it often, to prevent it from burning; when thoroughly done it will cease boiling; then butter a pan and put it in to cool; if sufficiently done it will be crisp and brittle; if not it will be tough and ropy. Nuts of any kind may be added just before it is put in the pan; they must be well stirred in. The candy may be worked by keeping the hands well covered with flour, or by greasing them well with butter. The working must be done as soon as it is cool enough to handle. It may be made of molasses only—in this case it requires longer boiling—and other flavoring may be used instead of lemon.

ANOTHER RECIPE FOR MAKING MOLASSES CANDY. One quart good molasses, one half cup vinegar, one cup of sugar, butter the size of an egg, and one teaspoonful saleratus.

1st. Dissolve the sugar in the vinegar.

2d. Mix with the molasses, and boil, stirring frequently until it hardens when dropped from the spoon into cold water; then stir in the butter and soda, the latter dissolved in hot water.

3d. Flavor to your taste, give one hard final stir, and pour into buttered dishes.

4th. As it cools, cut into squares for "taffy," or, while soft enough to handle, pull white into sticks, using only the buttered tips of your fingers for that purpose.

BUTTER-SCOTCH. Sugar, 1 pound; butter, ⅓ pound; cream of tartar, ½ teaspoonful. When done, which you can determine by dropping in cold water, pour into buttered pans to cool, then cut into any shape desired.

SUGAR CANDY. Six cups sugar, one cup of vinegar, one cup of water, tablespoonful of butter put in at the last, with one teaspoonful of saleratus dissolved in hot water.

1st. Boil, without stirring, half an hour, or until it crisps in cold water.

2d. Pull white with the tips of your fingers.

3d. Flavor to taste.

DEGREES OF BOILING SUGAR. In preparing sugar for candies, etc., the confectioner requires different degrees of boiling in order to bring the sugar to the proper state for the various articles he prepares.

Well clarified and perfectly transparent sirup is boiled until a skimmer dipped into it, and a portion touched between the forefinger and thumb, on opening them, is drawn into a small thread which crystallizes and breaks. This is called a *weak candy* height.

If boiled again, it will draw into a larger string, and if bladders may be blown with the mouth through the drippings from the ladle, it has acquired the second degree, and is called bloom sugar.

After still further boiling, it arrives at the state called feathered sugar. To determine this, dip the skimmer and shake it over the pan, then give it a sudden jerk, and the sugar will fly off like feathers.

The next degree is that of crackled sugar, in which state the sugar that hangs to a stick dipped into it, and put directly into cold water, is not dissolved off, but turns hard and snaps. The last stage of boiling reduces it to caramel sugar, and is proved by dipping a stick into the sugar and then into cold water, when, on the moment it touches the water, it will snap like glass. It has now arrived at a full candy height. Throughout the boiling, the fire must not be too fierce, as it will discolor the sirup. The best safeguard against this is the use of steam heat.

Color may be given to the candy by adding the coloring matter to the sirup before boiling it.

Flavoring essences must be added when the process is nearly complete.

Cane, Sugar. Most of the sugar used in the United States, especially the refined sorts, is produced from the tropical sugar cane, and Central Louisiana is as far north as it will succeed profitably. The West and the East Indies are its home. In Cuba it attains a height of twenty feet, with a diameter of one and a half inches one foot above the ground. In the Gulf States it seldom exceeds ten or twelve feet. It is propagated by layers, the canes being placed in furrows three or four feet apart; they send up a shoot at each joint, which makes the canes six or eight inches apart in the rows. Three crops are generally produced from one planting, though each succeeding crop is smaller than the preceding one, but the juice is richer in sugar. In Louisiana the planting is generally done in February, and cutting commences in October. The ripe cane, stripped of its leaves, yields 12 to 20 per cent. of its weight in sugar, on careful analysis, though the half of that amount is seldom obtained in the manufacture; and of this amount from 10 to 15 per cent. drains off as molasses. The yield of sugar in Louisiana ranges from 500 to 2,000 pounds per acre. To express the juice, expensive machinery is required, and to manufacture the same into sugar requires the skill of trained artisans.

Cane. In this article we treat only of the Northern varieties of sugar cane, namely: Sorghum, Imphee and Amber. This may be an important product to the people of the North, as it enables them to make their own sugar and molasses, and so have it pure and unadulterated. The culture of this cane and the manufacture of its juice into molasses are both pleasant and easy, and there is a kind of charm connected with the business all the way through. It is believed that it is more valuable than corn for fall and winter fodder, especially when grown thick, say from four to eight pounds of seed per acre, and that it is next to corn in its fattening qualities for swine, who feed greedily upon it through the winter. It yields 150 to 250 gallons of sirup to the acre, which, at 50 cents a gallon, would be $75 to $125, with no more outlay than raising so much wheat or corn.

CULTURE. In general it may be said that Sorghum and Imphee will thrive on any land that will produce a fair crop of corn or wheat. The best results, however, can be expected only from soil adapted to the special wants of these canes. Sandy, upland soil is best, and black bottom soil is the worst. New land yields good sirup; land freshly manured gives poor sirup; clay land gives good sirup, but not so large a yield. The soil, unless rich, should be well manured in the fall with vegetable or rotten stable manure; this is especially needed with clay land. A well manured crop the previous year, well cultivated, puts the ground in the best condition for the culture of cane.

Plow deep, and pulverize thoroughly by throwing into ridges; the soil will be better affected by the frost during the winter and will dry out sooner in the spring. In general, prepare the ground as for corn. In sections where the cane will be liable to frost in the fall, the planting should be done early,— as soon as the ground is thoroughly warm. In the South, early planting will give two crops from the same stand. Test the seed some time before planting, so that if found poor, there will be time to get a good lot in due season. Soak the seed a few hours in warm water, put it into a small bag, envelop it well in woolen cloths and keep it in a warm place, frequently shaking it until it begins to sprout. Some bury it in the ground. Then roll it in plaster or fine loam and plant one inch deep, rows three feet apart each way, at the rate of two pounds of seed to the acre. Plant in check rows, as for corn, so that it can be plowed both ways. Immediately after planting, throw a handful of plaster or fresh ashes on each hill. In the Eastern or older States it is well to fertilize the ground with lime, ashes, salt, guano and the phosphates generally. On the first appearance of weeds or grass, run the cultivator both ways. Experience proves that nine-tenths of the chances of success and failure lie in the first few weeks of the young plant's life, and therefore all the cultivation should be done then,—carefully, thoroughly and well; when about 30 inches high it may be left to itself, as further plowing will only damage the crop, by cutting the roots and injuring the stalks. Pull off the suckers.

HARVESTING. The cane should not be cut until the seed is in the doughy state, the Imphees a week or two earlier. Some cultivators insist upon making up the cane as soon as cut, and others say it is better to delay the manufacture as long as the cane can be kept in perfect condition. Some also are in favor of stripping off the blades about the time of the first frost, and some consider that the stripping is better done just before grinding; a few do not strip at all. What is the best course to pursue may depend upon circumstances,—such circumstances as have not yet been statistically compiled, so as to determine these disputed questions. To prevent the dark color of the sirup from the Imphees, they should be stripped early. The upper third of the stalks should be cut off at the time of harvesting, bound into bundles with the blades, to be used as fodder for cattle; it is excellent for this purpose. Freezing is thought to increase the amount of sugar, but when the cane is once frozen, it must not be suffered to thaw out until it is manufactured. Preserve the seed, as it also is valuable for stock feed,—even more valuable than oats. The seed is also good breadstuff for man; some have said it is even better than wheat. Until it is made up, keep it in piles or ricks, under cover.

VARIETIES. The most common variety of sugar cane in the Northern States is the Chinese or Sorghum (sometimes spelled Sorgho or Sorgo). Its most striking difference from the African kinds consists in the spreading character of the tassel. The stalk is tall, tapering and graceful, reaching the height of 12 to 15 feet. As the plant approaches maturity a whitish efflorescence appears underneath the leaf-stems. This variety requires about five months for its full development, though the time is materially modified by soil, season, etc. As the seed approaches maturity and ripeness, it changes its color from green to a dark purple or black.

Of the African, or Imphee, there are several varieties, three of the best of which are of equal value, namely, the Liberian, the Neeazana and the Oomseeana. They all have heavy, compact tassels, and, although two weeks later in maturing, these varieties may be cut a week or two earlier than Sorghum, that is, when the seed is "in the milk." The Liberian was at first considered inferior to Sorghum, but its reputation is growing comparatively better. In some places it yields more and better sirup than the Chinese. It is also supposed to be freer from mildew, rust or blight of any kind. The Neeazana should be cut while green and made up immediately, when it yields a pure and light-colored sirup. The Oomseeana is good for sugar, but does not yield as largely in sirup as either the Liberian or the Sorghum.

The "Minnesota Early Amber" cane is the best for the high North, being better than the common Amber, or, of course, any other kind of cane. In appearance it presents some of the characteristics of both Sorghum and Imphee. It grows quite tall and yet not quite as tall as the Sorghum. Its heads are not so open and branching as the Sorghum, but are more open than either the Liberian, Oomseeana or Neeazana. When fully matured the seed is but slightly enclosed in its glumes. It receives its name from its ripening early, and from the bright, amber color which characterizes the sirup when properly made from it. The new Early Amber is three to four feet taller than the ordinary cane, and is very rich in saccharine matter, the proportion being larger than in any of the many varieties of Chinese and African cane introduced into this country. The sirup, if properly made, is free from the cloudy appearance, offensive odor and taste peculiar to Sorghum. It is of a beautiful, clear amber color, and of a delicious flavor resembling honey. It is very prolific, the yield to the acre being greater than any variety ever grown in the North, not even excepting the old regular Sorghum. As much as 288 gallons sirup to the acre has been obtained. The Early Amber is especially adapted to a high latitude, from the fact that it is a very early cane. It will ripen wherever flint corn will mature.

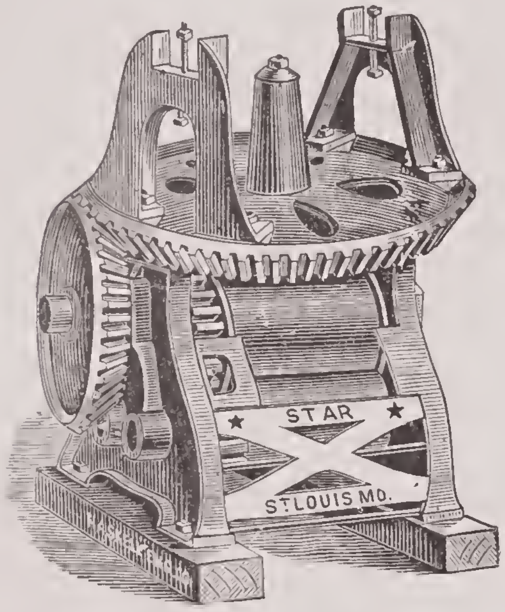


Fig. 1.—*"Star" Cane Mill.*

Manufacture. Under this head it is hardly necessary to observe how essential it is to keep the material perfectly clean. As to the mill, the stronger the better, such as the "Star" cane mill (Fig. 1). It is very heavy, does not clog, and the rollers have guides which prevent the cane from running out at the ends. The spur gearings are all inside the side plates, and are protected so that they are free from obstruction, thus avoiding the danger of breaking the mill by getting anything between the cog-wheels, or danger of accident by the operator having clothes caught in cogs while operating the mill. The rollers can be adjusted to any desired capacity. They are so geared as to make two revolutions to one of the horse's. The mill can be run with any portable farm engine or threshing-machine horse-power. The same party, J. A. Field & Co., St. Louis, Mo., manufacture also a vertical, three-roll mill called the "Forest King," Fig. 2. It is a very desirable mill, and has many points of excellence. Two sizes of this mill are made, 375 and 600 pounds, with a capacity of 40 to 60 gallons per hour.

To save labor in handling the juice, the mill may be placed, where the location will permit, above the level of the evaporator on a hill-side, or elevated plane. Where the location prevents such an arrangement, the mill should be set on posts firmly planted in the ground, about three feet above the surface, and the juice conducted by a trough to the evaporator and pumped up into the juice tank ready for feeding the evaporator. The cane should be fed butt end. The mill should be strong enough to press out all the juice, leaving the bagasse dry, or there will be serious waste of juice. The mill should have three rolls; otherwise there will be a great loss of juice.

The juice should be evaporated as soon as practicable after it is expressed. It should not be exposed to the air over twenty minutes before heating to the boiling point. Filter it through bright hay or a woolen cloth, and convey it to a double tank through a pipe. When one side of the tank is filled, shovel in one gallon clay subsoil, sprinkled with lime, to fifty of juice. Stir well and allow it to settle, packing hay over the faucet, which should be near, but not at the bottom of the tank. Prepare one gallon new milk with two ounces of soda to every 100 gallons juice. Place over the evaporator, so as to make a continual dropping where the juice breaks into the boil. Use no other drug, especially of an alkaline nature. The boiling can all be done with the bagasse and cane-tops with a furnace properly constructed. Neither wood nor coal will excel this fuel for the purpose.

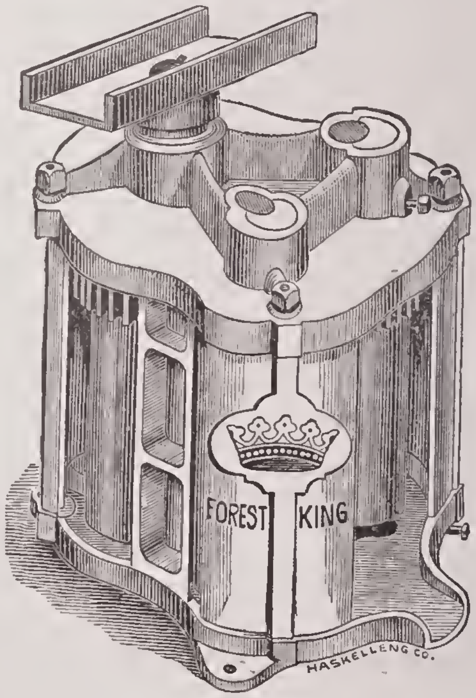


Fig. 2.—*The Cane Mill "Forest King."*

And now comes the climax of all the process, the reduction to sirup, and without that simple combination of furnace, boiler and cleanser, in the adjustable rocking machine called the "Mound

City Evaporator," Fig. 4, or some equivalent, no one could have patience to engage in the business at all. But this is so simple, economical, portable and effective, that it is a pleasure to run it, and instead of its being the burning, sooty, dipping, daubing operation of the old way, the work is cleanly, pleasantly and quickly performed.

Its construction is upon a new principle, which secures the constant flow of the juice, from the time it enters until it passes off sirup. It also retains the scum and feculent matter at the ends of the several channels, from which it can be removed every half hour, and performs the cleansing operation better than by introducing alkalies and foreign ingredients. It is made of sheet metal, galvanized iron or copper, of thickness proportioned to the size of the pan, having ledges to project upward, across the bottom of the pan, the alternate ends being open so as to form a continuous channel from one end of the pan to the other. The sides of the pan extend beyond the fire line of the furnace, so as to give a cooling surface for the collection of the scum.

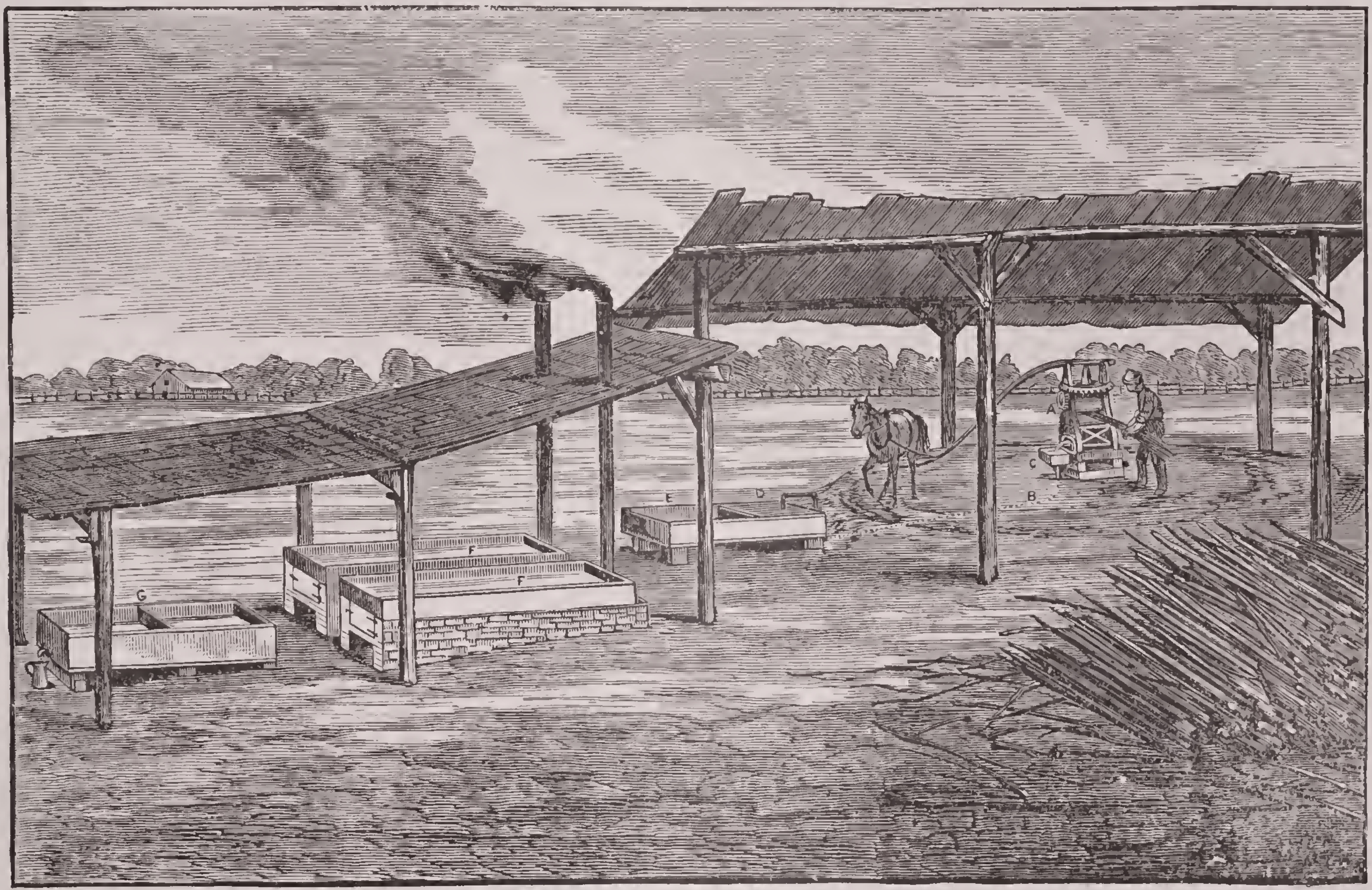


FIG. 3.—*Position of Mill and Evaporator.*

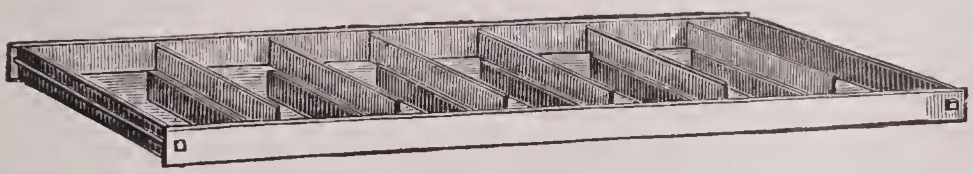


FIG. 4.—*Mound City Evaporator.*

The evaporator should be capable of producing the most and best sirup with the least expense and labor. To secure the best result the juice must be exposed to the fire the shortest possible time. To do this a shallow, moving body of juice is indispensable. Even this will not make the best quality of sirup unless the juice during evaporation is exposed suddenly to alternate heat and cold, thus freeing it more effectively from its impurities. Good, well-seasoned wood, or the dried bagasse, should be provided for the evaporator, that the fire may be kept evenly hot. The evaporator should be set on a firm and level foundation, with the mouth toward the prevailing winds. An ash pit should be dug under the grate, and kept clean. It should be protected from the wind. Sour juice can not be worked to advantage. The skimmings make excellent food for hogs.

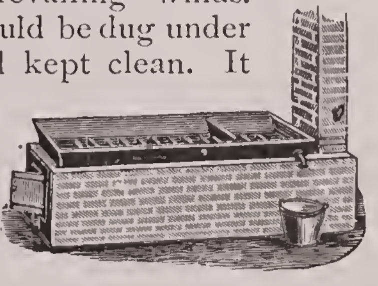


FIG. 5.—"*Improved*" *Evaporator.*

Fig. 5 represents a very simple yet efficient apparatus for making maple and Sorghum molasses and sugar. It is known as the Improved Evaporator, and is made by the Vermont Farm Machine Co., Bellows Falls, Vt.

Prime vinegar may be made from the washings of the evaporator, that is, the sweetened water which follows the sirup on finishing for the day. This should be run off into casks, care being taken to give it air, and to keep it from freezing during the winter. In the summer expose it to the air, and excellent vinegar will be the result. Good vinegar may also be made from the skimmings by much the same process: see Sugar.

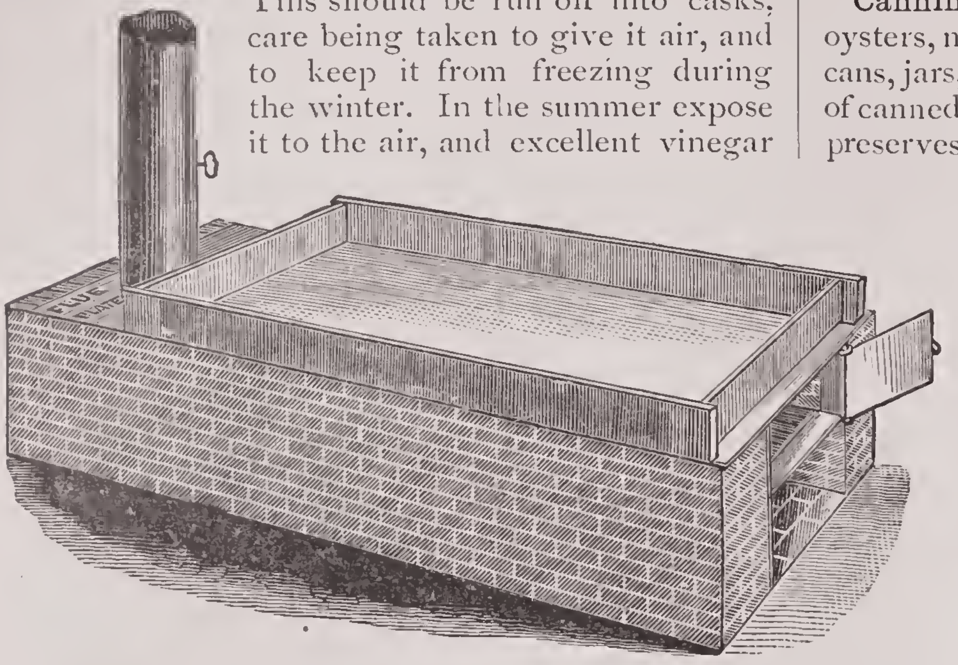


Fig. 6.—*Galvanized Iron Evaporating Pan and Furnace.*

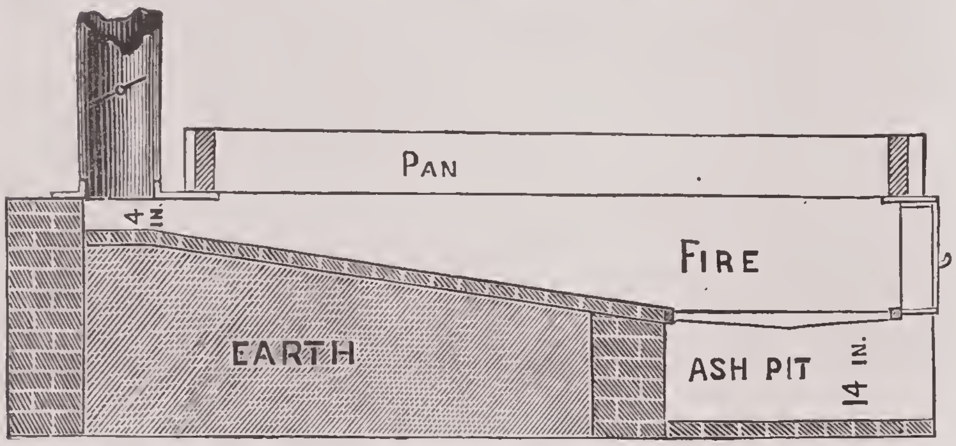


Fig. 7.—*Sectional View of Furnace.*

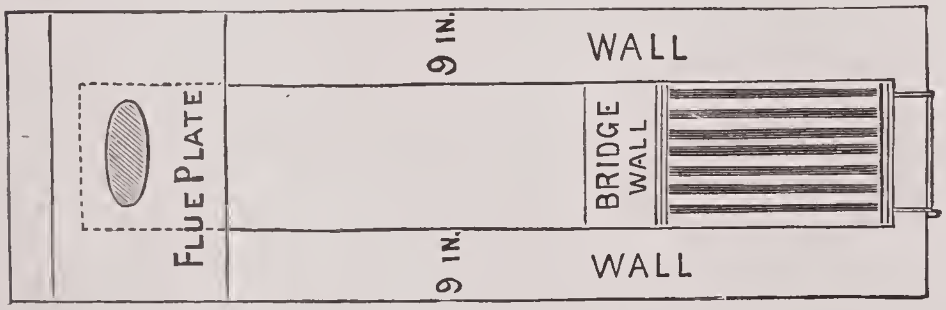


Fig. 8.—*Top View of Furnace. Pan removed.*

Canine Teeth, the longest and most pointed teeth, of which there is one in each side of each jaw; called also "eye teeth."

Canker, a corroding humor or ulceration, especially in the mouth. For this disease, one should not medicate without the advice of a physician. The term also denotes a disease in trees, causing the bark to rot and fall off: see Apple.

Canker Worm: see Apple.

Cannel Coal, a kind of soft coal which burns with a steady flame.

Canning, the art of preserving fruits, vegetables, oysters, meat, and other food in their natural state in cans, jars, etc., hermetically sealed. The popularity of canned goods arises from the fact that this process preserves different foods in their natural state, which are always more healthful, and grateful to the taste. This method also facilitates transportation, and defies climatic influences and changes of temperature. Canning in glass jars is in some places called "bottling." So to seal as to exclude all the air in which the germs of decay are not killed, is the great object in canning fruit. It cannot be *perfectly* done, not even with an air pump. It may, however, be so nearly done as to preserve fruit for years. To accomplish this, the cans have to be heated after the fruit has been deposited in them. Modern science asserts that the reason why heating and sealing preserves fruit, is because the heat destroys the germs of fungoid growth (whethes the germs be animal or vegetable), and thus prevents decay, the sealing preventing the ingress of any more germs.

In making the canning process perfect, care must be taken that the cans and their covers are not defective, and that the screw, or whatever means of sealing is employed, fits accurately and works properly. Have both fruit and jar boiling hot, and the jar brim full when sealed, that as nearly all the air as possible may be excluded.

The sealing must be done quickly after the can is taken from the water, as cooling will cause condensation of air in the can, and this should be prevented. If a rubber screw jar is used, screw tightly at first, and turn on the cover two or three times while the fruit is cooling. The thread of the screw, on jar and cover, must be perfectly clean, or the sealing will be imperfect. If these directions are faithfully followed, not a can in a thousand will turn out imperfect fruit when opened.

Glass jars are better than tin cans. The acids of the fruits act upon the tin and solder of tin cans, which sometimes become corroded, forming poisonous salts. The danger is less when pure tin is used, but absolutely pure tin is rarely used in making fruit cans. A glass jar, with a porcelain-lined metal cover, screwed down upon a rubber ring, is a good article, and the best for domestic use. They are not very expensive, and are largely used by housewives. They have the great advantage of enduring use for several years.

In selecting and preparing fruit for canning, freshness and freedom from blemish are the first requisites. The sooner canned after picking the better. All table fruit, except small plums, grapes, berries, etc., should be pitted and peeled. Some of the larger fruits will need to be halved, quartered or sliced. White sugar is best, if sugar is used at all. Peeling peaches and tomatoes can be facilitated by plunging them into hot water. A corn-popper is handy for this.

Tin cans must either be sealed with wax or soldered. The latter is the better method if it can be done without too much trouble and expense. There are irons made on purpose, and almost any one can learn to use them. Sealing wax is made by melting together rosin, one pound; beeswax, lard and tallow, one ounce each. Melt over a slow fire, and stir occasionally. When using, the wax must be hot, and the dish large enough to admit the top of the jar. The dish should have a snout to enable the operator to pour the wax upon the can.

When glass jars are used, they are placed in cold water, in a boiler over the fire. A cloth or board is put in the bottom of the boiler for the cans to stand on to prevent breaking. A porcelain or copper kettle must be used for cooking the fruit. Iron or tin will discolor the fruit, besides generating poison. Have as much fruit in the kettle as you can handle well, and cook until done, using only water enough to prevent scorching, and furnish sirup enough to fill the cans. A boiling hot sirup made of white sugar is used, while some apply the sugar to the fruit after it is served on the table. Sugar is not necessary to preserve the fruit. When used, the sirup should be made in a separate kettle, and poured into the can after the fruit has been placed therein. Sometimes three or four pounds of sugar is added to the bushel, while the fruit is cooking, but it is not necessary. After placing the fruit in the cans, leave them in the hot water for ten or fifteen minutes to settle; then fill to the brim with sirup, or the liquid from the fruit-kettle; clean the sirup from the top of the can, then put on the cover, hold it down with a sharp instrument, and pour around it the hot wax, or solder it down. If there is a bubble in the wax, break it and apply more wax.

When bottles or jugs with corks are used, push in the cork firmly, and thrust the top into the melted wax. If it is not convenient to place the fruit in cans while they are standing where they were heated, they may be put into a pan of hot water and left until sealed.

Each can or jar should be labeled with the name of the variety of fruit which it contains, and the date of canning. A good and cheap cement for this purpose is made by dissolving one pound of glue in one pint of skim milk. Stir well, and avoid burning the mixture.

A cellar, cool, dry and nearly dark, or a closet, is the best place to store canned goods. The cans should not be placed against the wall, and should be raised above the floor. They should be examined occasionally to see whether fermentation is taking place. Should a thick mold form at the top, it will do no harm. If fermentation is noticed, boil the fruit again and can. In case fermentation is well advanced, throw the fruit away, and the can may be filled again with fresh fruit or vegetables.

The following are more specific directions for canning special fruits and vegetables:

To can peaches, peel, halve and pit them; boil the pits till the flavor is extracted, and pour the liquor into a porcelain kettle; put into the kettle prepared peaches enough for three or four cans, and place over the fire. When the peaches are hot, can them and seal.

Pears should be cut in halves, and the stems left on, as they add to the appearance of the fruit. After peeling, dip each piece into cold water to prevent discoloring. Place a little cold water in the kettle with the fruit, and boil twenty or thirty minutes.

Plums should be canned whole, unless large, when they may be halved and pitted; but they should never be peeled. If pitted, boil the pits the same as you do peach pits.

Blackberries, raspberries, cherries, currants, strawberries and gooseberries are simply thrown into a little sweetened water and scalded, not cooked.

Crab-apples can be treated as pears, unless small, when they should be canned whole. Quinces may be treated as pears. Strawberries come so early that they are difficult to keep with perfect flavor; yet, put up with care, air-tight, they can be kept. The bottles should be buried in the cool earth, either in a box, or simply in the ground, kept from the light and as cool as possible. In this way they retain flavor nicely and make a delightful change on the table later in the year.

In canning vegetables, being less tender and acid than fruit, they may be canned with less risk and loss. The process is the same in all respects.

When corn is to be canned, cut the kernels from freshly-gathered corn. Fill the cans with corn and solder; place over the fire the cans in enough cold water to cover them, and boil gradually for one and a half hours; then punch a small hole in the top of the can to allow air and gas to escape, and instantly solder. Place the can in hot water, and boil for two and a half hours longer. The juices supply sufficient moisture in the cans so that they need no water. Wax cannot be used in sealing. The corn should be of the sweet or evergreen varieties, picked when just right for the table. Another method is to cook the corn as for present use, place in the can, pour in enough water, well salted, to cover the corn, fill the can, then seal. Some put one ounce of tartaric acid to eight quarts of corn, and cover it with boiling water. Boil it constantly half an hour, and put it up only in Mason porcelain-lined jars. Tighten occasionally while cooling, to exclude air, and cover the jars with rags to keep light off. When opened to cook, put enough soda to get rid of peculiar sourness.

To can corn in the raw state, silk your corn well and cut it off the cob without cooking, and put it in a jar, and to five gallons of corn put one of salt. Have just brine enough to cover. This will keep two or three years. When you cook it, drain out and put in plenty of fresh water to soak over night, and season with butter and pepper and a very little white sugar.

To can rhubarb, clean and slice as for pies; put in a glass bottle; fill up with water and seal. Do not cook it.

Tomatoes should be scalded and peeled, and, if large, cut. Have a board in the bottom of the boiler, with holes bored in it, on which to set the cans. Put water in the boiler till within two inches of the top of the cans; boil till the tomatoes are well cooked; with a spoon crowd down, fill the can full, seal and cover quickly with several thicknesses of cloth, letting stand till next morning; then set the cans in the darkest part of the cellar, or in a box cupboard that can admit no light, but where they will be dry and not freeze. Tomatoes treated in this manner will often keep two or three years. Corn and tomatoes are often canned together—one part corn to three parts tomatoes; but they should be cooked separately.

Peas, onions, asparagus and beans are easily canned. String the beans and break in two or three pieces; throw into boiling water and scald. After filling the can, pour on well-salted hot water, and seal. Succotash can also be canned, the separate vegetables being scalded apart from each other.

To keep fruits without loss of color or flavor, to each pound of resin put in 1 ounce of tallow, and 1 ounce of beeswax. Melt them slowly over the fire in an iron kettle, and be careful to not let it boil. Take the fruit separately and rub it over with whiting or fine chalk (to prevent the coating from adhering to the fruit), then dip into the solution once and hold it up a moment to set the coating; then pack away carefully in barrels or boxes in a cool place. When you dip oranges or lemons, loop a thread around to hold them; for pears or apples insert a pointed stick to hold them by; then cut it off with a pair of sharp, heavy shears. Oranges or lemons cannot be put in boxes, but must be placed on shelves, as the accumulated weight would mash them down.

Peaches, pears and plums, also green tomatoes and cucumbers, may be kept perfectly by packing them in fine salt, in stone jars, allowing them to make their own brine. They must be kept covered with salt until the brine made by the salt and extracted juice covers them; then kept under this brine until wanted for use, when they must be soaked in several waters until fresh enough to put into vinegar.

Cantaloupe: see Muskmelon.

Canter, a gentle gallop in which all the feet of the animal seem to follow one another in a row, instead of two following two, as in the full gallop.

Cantharides (can-thar′i-deez), Spanish flies; used for blistering.

Cant-Hook, a wooden lever with an iron hook at the end, for canting or turning over heavy logs.

Cantle, OF A SADDLE, the hinder part, projecting up in the form of a rim.

Canvas, coarse cloth made of hemp or flax, used for tents, sails of ships, painting and other purposes; also, a clear, unbleached cloth, woven regularly in little squares: used for working tapestry with a needle. The best flexible paint for canvas is probably the following: Dissolve 2½ pounds good yellow soap in 1½ gallons boiling water, and grind the solution while hot with 140 pounds of good oil paint.

Caoutchouc (coo′chook), India rubber.

Capillary Attraction, that which exists in a small tube, in which a liquid will rise to an indefinite height. Exemplified by masses of cotton, wool, sponge, sand, etc., which are filled with small spaces.

Capon (ca′pon), a castrated cock or rooster. Capons grow larger than roosters, and their flesh is as much better for eating as that of an ox is better than bull's flesh, or as a barrow's is better than that of a boar. The Asiatics or large breeds are the only varieties worth caponizing, and of these the Brahma and Partridge Cochins are the best. Well-bred specimens will average, at 9 to 11 months, when dressed, 10 pounds each, and sell for 75 cents to $2.50. Capons are very quiet, associating only with each other; are never quarrelsome, and may be taught to take care of young chickens. This is done by picking most of the feathers from the breast of the capon, and placing him under a barrel at night. Some young chickens are also placed under the barrel; these immediately seek shelter under the capon, and he is willing to permit them to cluster under him because of the warmth they impart to his denuded breast. He will even spread out his wings and draw them under him. This soon becomes a habit, or the capon becomes attached to the chicks, and keeps with them and cares for them until they are large enough to care for themselves.

Caponizing, castration of cocks (roosters). To perform the operation well, it is necessary to have some preliminary practice. In the first place examine carefully the fowls that you kill for the table, so that you may be able to tell the exact position of the organs to be removed. You will find them attached to the back, one on each side of the spine; they are light colored and shaped something like a Lima bean. The size varies with the age and breed. Next kill some young cockerels and practice on them until you are sure that you can perform the operation quickly and successfully; then you may try your hand on the living chickens.

Select young cockerels that are fully three months of age, and not over four months; but some who caponize operate successfully upon cockerels that are five or six months old. Keep them from food for 24 hours previous to the operation; if the intestines are full the operation will be more difficult. Draw the wings gently backward and secure by a broad strip of soft cloth; lay the fowl on the left side, draw the legs backward and secure by another strip of cloth. From the spot near the hip joint, and between the last two ribs, pick off the feathers for the space of an inch square. With a small sharp knife make a cut an inch and a half long, through the skin, then another through the flesh between the ribs, and lastly through the thin membrane that lines the abdominal cavity—taking care in the last cut not to injure the intestines, and see that you make a clean cut every time. Now introduce the fore finger, which should be well oiled, find the testicles, scratch them off with the finger nail, and bring them out with the finger. If you have practiced enough on the dead chickens you can do this quickly and readily; and if you haven't practiced enough on the dead fowls you have no business to attempt the operation on the living ones. This part of the operation over, bring the edges of the cut together, take two or three stitches and press the feathers that were removed upon the cut to absorb the blood and cover the wound. Feed sparingly for a few days. Of course some of the chickens will die, but unless you bungle your work awfully the loss will be trifling.

Instead of performing the chief part of the operation with the finger, as above directed, some use the caponizing instruments that are made especially for the purpose; but one can do just as well, if not better, with no instrument except a sharp knife, his finger nail, a needle and some white sewing silk.

Caps. The nature of this work allows us to say nothing under this "cap"-tion, except that, as a general rule, they confine the exhalations of the scalp more than hats, and are therefore more unhealthful; but they have the advantage of being kept on the head better when one is at work.

Caramel (car′a-mel), burnt sugar; a black, porous substance, obtained by heating sugar to about 400°. It is soluble in water, forming a dark brown solution, and is used to color brandy and other spirits. This is also the name of a popular kind of candy. See Candy.

Cheap Caramels for Children. Take one cupful of water, one of sugar, one-half cupful of grated chocolate, and a piece of butter the size of a walnut; boil the water, sugar and butter to a sirup, and add the chocolate when nearly done; stir to prevent lumping; spread on greased paper, and cut into squares. Or, one cupful of milk, two cupfuls of sugar, two cupfuls of New Orleans molasses, one cupful of chocolate; boil till it candies; be careful not to burn; pour on greased tins, and mark in squares.

Caraway (car′a-way), a biennial plant of the parsnip family, the seeds of which have an aromatic smell and a warm, pungent taste. They are used in confectionery, and also in medicine as a carminative. Also, the term denotes a kind of sweetmeat containing caraway seeds. To raise caraway, sow the seeds in drills six inches apart, early in spring; weed and hoe. The seeds ripen in autumn. The roots are perennial, and yield well for three years.

Carbolic Acid, an oily liquid, colorless, having a burning taste and the odor of creosote, to which it has great resemblance. It is obtained from coal tar. Its form is that of an acid solution, though it is sometimes sold in crystals. It may be applied with safety to all parts of the body or legs of animals, and is invaluable for destroying lice, wood ticks, and all forms of parasite life; and by merely washing or moistening those parts of the legs and bodies of horses, cattle, and sheep chosen by the bot, horse, or other flies to deposit their eggs, their hatching or even deposit may be prevented. As a disinfectant in stables and buildings infected with malaria and distemper, it is of great value. To disinfect such places, wash the walls and ceilings with a tablespoonful of the solution of the acid to a bucketful of water.

For sores and wounds, when unhealthy, a good application may be made by adding one dram of the acid to one pint of water. This will destroy all putrefaction and induce the wound to take on a healthy action.

Carbuncle. This commences with a hard, red swelling, which soon becomes of a purple or livid color; the tumor, as it extends, becomes soft, little pimples form on the skin around the center mass, which soon break into small ulcers, from each of which oozes a thin, irritating discharge. After some days these small ulcers spread, and uniting form three or four large suppurating surfaces, from which the discharge becomes strong and tenacious. A carbuncle differs from a boil in having no core, and terminating in gangrene, or sloughing, instead of suppuration. Treatment: Keep cold by one thickness of cotton or linen cloth, until it is about as large as it will probably become, then cut across as for a boil, to relieve the pressure. There is very little or no discharge, and that little will be blood, or bloody pus. After the incision warm applications may be made, to allay the pain. No medicaments can hurry it or cure it, but that condition of the system which produces carbuncles may be altered by a radical change in the diet and mode of life.

Cardoon, a plant resembling the artichoke. The stalks of the blanched inner leaves are used as salad in soups, etc. The seed is sown in April, in rich earth. It requires nearly a month to start. The plants should be thinned to five inches apart. Transplant in June, and allow four feet to each. Dress like celery. As they grow, tie up the leaves and earth up several times; they may thus be obtained two feet high. They are to be taken up during winter, like celery. An ounce of seed will produce about six hundred plants. For seed, protect the plant without blanching, through the winter, and it will flower in July following.

Carney, a disease of horses, in which the mouth is so furred that they cannot eat.

Carpet. The time has passed when the "white sanded floor" is the pride of the housewife. Her pride is now to have as nice a carpet as her neighbor, and then preserve it as long as possible. As to the quality of the carpet for the farm house, we must let you judge; we can do no more than tell you how to take care of them. In putting down the carpet, the first thing necessary is to scrub the floor clean, then lay newspapers down two deep, or clean wheat straw, then put down the carpet. A stretcher should be used, and the carpet stretched as much as possible without tearing it. Carpets should be taken up and shaken thoroughly, if in constant use, as often as three or four times a year, as the dirt that collects underneath them wears them out very fast. Straw kept under carpets will make them wear much longer, as the dirt will sift through, and keep it from grinding out. Carpets should be taken up as often as once a year, even if not much used, as there is danger of moths getting into them. If there is any appearance of moths in carpets when they are taken up, sprinkle tobacco, powdered alum or black pepper on the floor before the carpets are put down, and let it remain there. When the dust is well shaken out of the carpets, if there are any grease spots on them, grate on potter's clay very thick, cover them with a brown paper, and set on a warm iron. It will be necessary to repeat this process several times, to get out all the grease. If the carpets are so much soiled as to require cleaning all over, after the dirt has been shaken out, spread them on a clean floor, and rub on them, with a new broom, pared and grated raw potatoes. Let the carpets remain till perfectly dry before walking on them. If they are still soiled, take a pailful of clean water, put into it three gills of ox-gall; take another pail of clean cold water, and rub with a soft scrubbing-brush some of the ox-gall water on the soiled places, which will produce a lather; then wash the lather off with a clean linen cloth dipped in the clean water; open the window to allow the carpet to dry. Every particle of grease can be removed from the carpet by observing the following: Scrape and pound together in equal proportion magnesia in the lump and fuller's earth. Having mixed these substances well together, pour on them a sufficient quantity of boiling water to make them into a paste; lay this paste as hot as possible upon the grease spots; next day brush it off, and the grease will have entirely vanished. Another method to remove grease is to mix a little soap into a gallon of soft water, then one-half ounce of borax, and wash the part well with a clean cloth.

To sweep a carpet, before applying the broom scatter over the carpet the refuse tea leaves from the tea-pot. This will prevent dust and brighten the colors. Indian meal is also recommended. In using a "carpet sweeper," bear down upon it slightly.

Carriages. In a country where riding in carriages is an almost universal custom among those who can afford the pleasure and convenience, the selection of a carriage and the manner of taking care of it are subjects of no small importance. The vehicle, as soon as it rises above the condition of a "business wagon," and is constructed with a view to comfort, elegance of appearance, and assumes the character of a "carriage," becomes an article of luxury, although by no means a useless one; and its selection is a question which should exercise both the judgment and the taste of the purchaser.

No carriage can really look well if it does not look serviceable. If for heavy work, it must be strong and appear strong, without appearing heavy or unwieldy. If for light work, it can hardly appear too light; for it is so generally known that delicately made carriages may be very strong, that the light appearance does not convey an idea of weakness. Economy and safety demand that the purchaser assure himself that the carriage is sufficiently strong and well made for the service for which it is required.

In these hints to those who would purchase a carriage either ready made or made to order, we would not claim that anyone, however experienced, can avoid being cheated if he falls into the hands of a dishonest maker who has no regard for his reputation. In a hundred things can a purchaser be deceived; the quality of the iron and steel, of the wood and leather, of the paint and varnish even, can only be tested by actual use; and the carriage-maker himself has to depend in a great degree on the "brand" or the reputation of the manufacturers, for the quality of many of the materials. Much more, then, must the purchaser of a carriage, which, when it is delivered to him is covered up with paint and trimmings, depend on the character of the carriage-manufacturers or merchants.

There are many varieties of carriages, of which we describe and illustrate the most common.

COACH. All paneled carriages with seats for four persons inside, and an elevated coachman's seat, are designated "coaches." Fig 1.

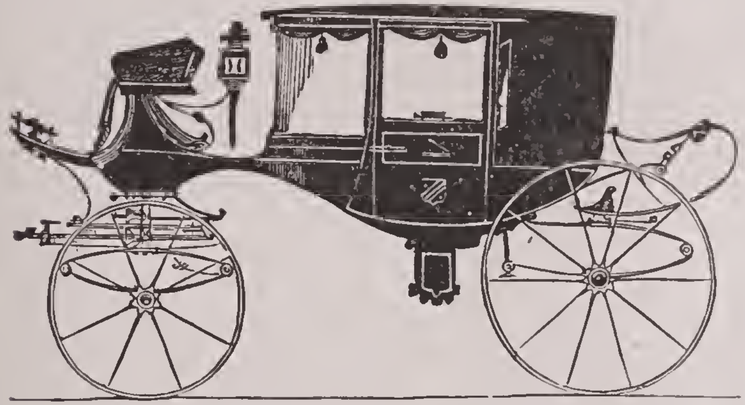


FIG. 1.—*Coach.*

CALASH OR CALECHE, a carriage with leather top, portable glass shutters on the sides, and a paneled front, with sliding windows. The whole front may be removed in a few minutes, making it an elegant open barouche, with a half-top over the back seat. No carriage is so desirable for both winter and summer use. They are made for four persons inside.

LANDAU is similar to the caleche, without the portable front and glass sides; the entire top being of leather supported by folding joints in each quarter. The top may be divided in the center, the whole falling front and back. These are complex in construction and liable to get out of order, which prevents their popular use.

BAROUCHE is made for four persons inside, and has an elevated coachman's seat; leather half top over the back seat, or an extension top, covering the four inside seats. The leather form is desirable for country use, as it affords protection from the sun and rain. The half-top for morning and evening drives is much liked; the top being thrown down, the carriage presents an elegant appearance, and affords an opportunity for the display of full dress; hence it is popular with visitors at watering places and public parks.

COUPE OR BROUGHAM. A half coach, with body for two persons inside and an elevated coachman's seat. A rockaway proper has a plain square or straight body, with standing top and leather curtains to roll up; for either four or six persons; all seats on a level. Of late years, all vehicles with standing top and seat on a level are called "rockaways." Some are made for six persons, with paneled sides and glass windows, which approach nearly to a coach in weight and cost.

BRETT. A brett proper is a French half-top barouche, with all the lines of the body at right angle. They are generally made with four inside seats, and elevated coachman's seat. The form more familiarly known in this country as a brett, resembles that of the English barouche, except it has only a half-top.

PHAETON. There is an infinite variety of phaetons now manufactured. As originally made, they have seats for four, with a portable half-top, or without a top; but the more common and popular kinds, at present, have seats for two. Fig. 2 represents an excellent build of the phaeton. This is a good carriage for old people or for the use of ladies, being wide and roomy, hung low, and the top coming well over the seat.

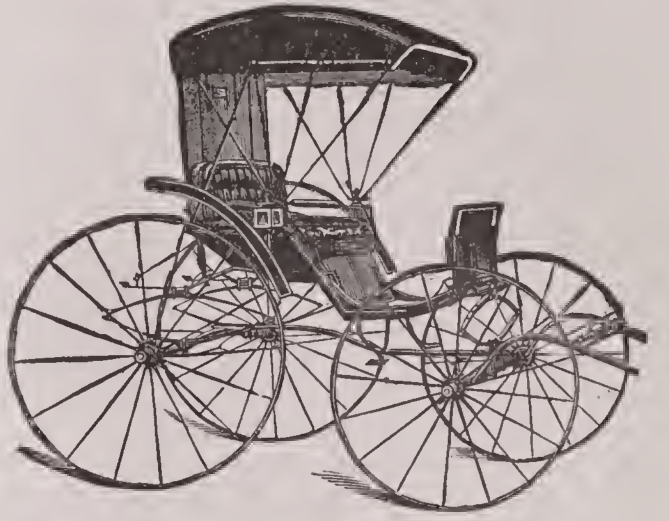


FIG. 2.—*Phaeton.*

DOG-CART is made with two or four wheels. The original English dog-cart is on two wheels, the body being nearly square, and carrying four persons. The back end of the body is made to drop and form

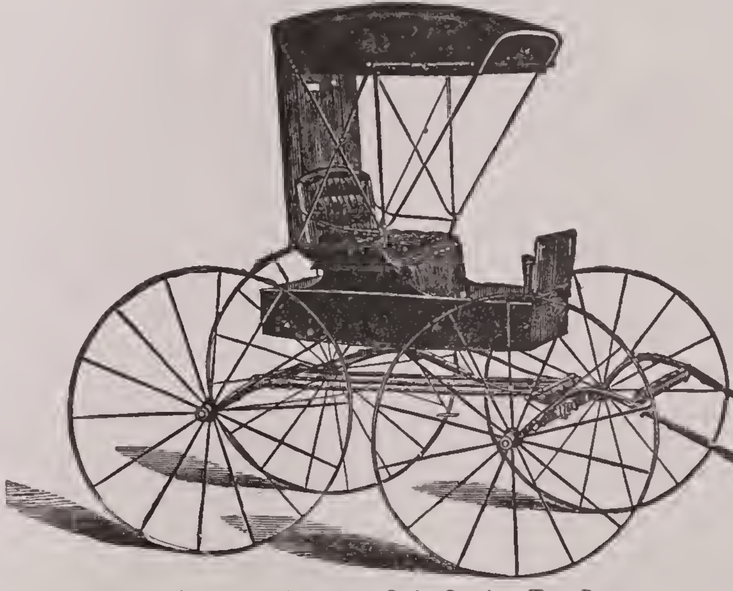


FIG. 3.—*Angular Side-Spring Top Buggy.*

a foot-board, the persons on the front and back seats riding back to back. The sides are generally made with blinds or lattice-work, to accommodate dogs, when used for sporting purposes.

BUGGY. Of this kind there is a great variety: all, however, have four wheels, and seats for two persons. They are made of every conceivable form, both with and without a top; at all prices, varying from $75 to $400.

We represent a standard and very popular buggy by Fig. 3. This is an angular, side-spring top buggy. Fig. 4 illustrates an angular or flat-top, side-spring, open buggy. These are made with square-corner body, and are a very neat and convenent buggy for country use.

A most excellent family buggy or spring wagon is shown by Fig. 5. This is a far more convenient and comfortable vehicle for a farmer to take his family to town in than the lumber wagon; besides, it saves much wear of the wagon, is easier on the team, and transit is much quicker. They are large and strong enough to carry four or five persons, and considerable produce. A farmer who cannot afford other carriages should at least make an effort to have one of these spring wagons.

To those who can afford a more imposing carriage, one adapted to all circumstances and usages, we recommend the style illustrated by Fig. 6.

In the construction of a carriage it is essential that all its various parts should be made of good material, well proportioned and made well. That the farmer may know something of the best material for the different parts of a carriage, and of the manner in which it should be handled, we give at some detail a description of these parts.

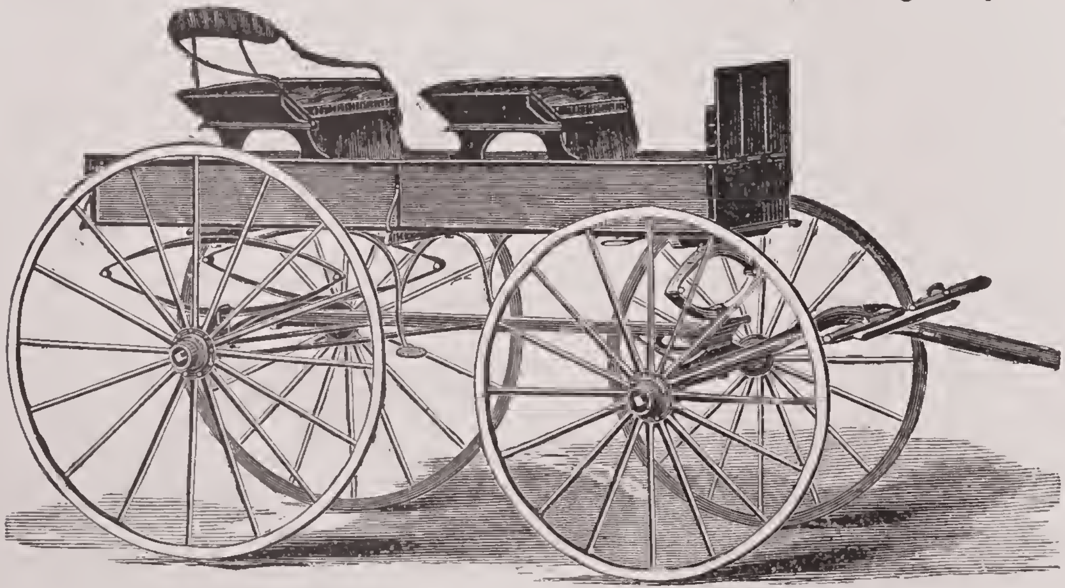


FIG. 5.—*Spring Wagon.*

The HUB of the wheel, being at once its center and foundation, mechanically speaking, should be particularly strong and of well-seasoned wood. Red elm, white elm, and particularly the gum, are good timber for this part, as they are not liable to crack in seasoning, or split by the pressure of the spokes.

SPOKES should, for heavy work, be made of white oak of clear grain, and free from checks or knots. For light carriages hickory is preferable,—14 in the fore wheel and 16 in the hind wheel, except in the vehicles of the lighter kinds, when two less in each wheel will answer. If the tenon or "tang," which is inserted in the felloe, is square instead of round, it will greatly add to the strength, though few makers are found who will take this trouble. Every spoke which is discovered to be defective, in any way, should be scrupulously rejected by the carriage-maker; for one bad spoke will spoil the wheel. In a business wagon, the spokes should be set in the hub in range, or in a straight line, while in a buggy or light carriage they should be placed alternately in and out, that the weakness caused by their light construction may be compensated for by the bracing position, which this zigzag position affords.

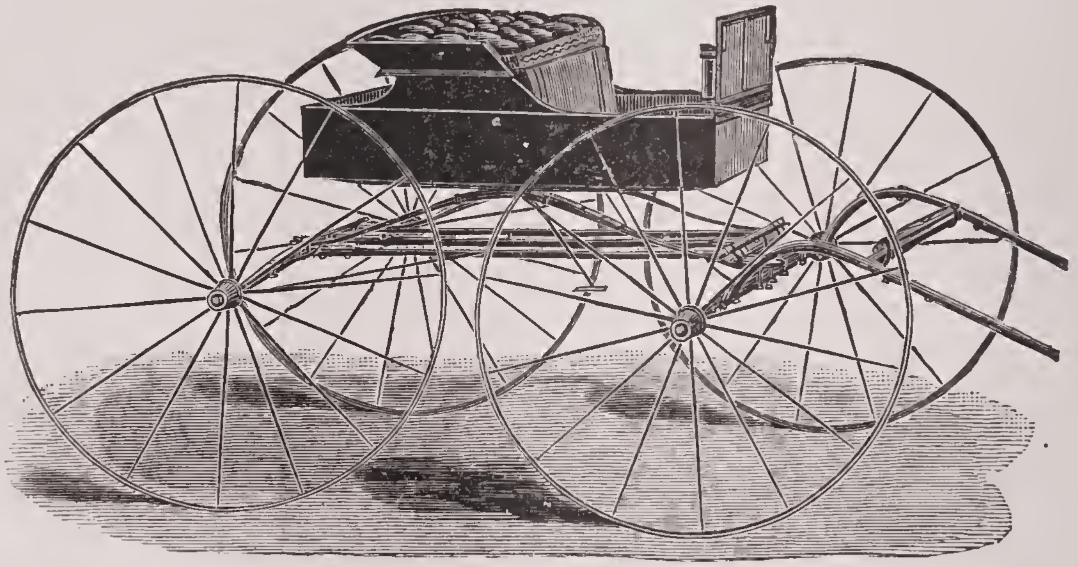


FIG. 4.—*Side-Spring Open Buggy.*

FELLOES OR RIM. This part of the wheel should be of the best Eastern white ash or hickory. (The Western growth is softer and more brittle). Oak is often used for this purpose, but is much more liable to sun-checks, and will split more easily, and is more apt to break in at the joints. For pleasure carriages, which are kept well painted, and, for the most part, secure from the weather, the bent rim is better than the short pieces or sawn felloes; but for business wagons, or those much exposed to the sun and rain, with the paint not always in the best condition, and which require a more frequent re-setting of the tire and the consequent cutting of the ends of the felloe-sections, it is better not to be obliged so often to cut the same ends as in the case when there are only two pieces. There are always, when the felloes are sawn, two spokes in each section.

The wheel should, in all cases, be dished, as this adds to their strength and durability. A light wheel for road wagons, four feet in diameter, should dish about three-eighths to one-half inch; the coach wheels, three feet six inches in diameter, should dish one inch, the measurements being taken, in both cases, after the tire has been set.

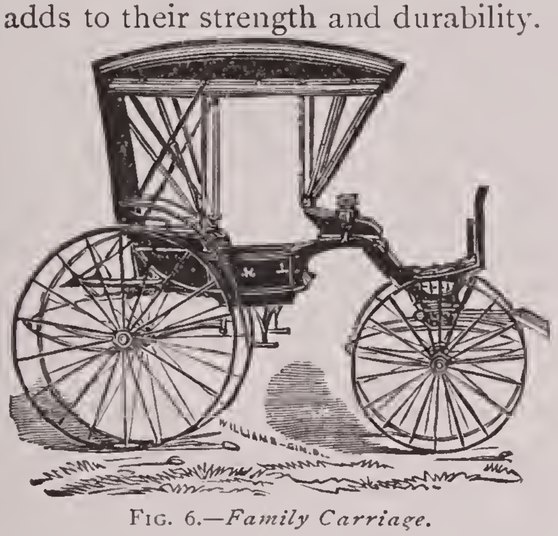


Fig. 6.—*Family Carriage.*

Tire. It is upon this part of the wheel that most of the wear comes, and if defects exist here, no excellence in the other parts will be of any avail. The important points in a good tire are, that it should be made of good iron, that it should be of the size best adadapted to the vehicle on which it is to be used, and that it be "set" well, neither so tight as to draw the wheel out of shape, nor so loose as to allow any racking of the spokes. Wide tires are desirable on soft roads, being less likely to cut in (causing the carriage to run heavily, and injuring the roads) than narrower tires. All tires should be fastened on with bolts, one between each two spokes.

Axle. Since the general introduction of the iron axle, the wooden axle has gone out of use, except for the heaviest description of wagons for the farm or other heavy work. Axles may be either straight, arched, or cranked; the arched form, which is essential for all very light axles, being stronger than the straight ones, though a very light arch answers the purpose.

Springs. These are of many kinds, as the old C spring, the ellipitic spring, and the shackle spring, the platform spring, etc. That in most common use, and by far the best for ordinary purposes, is the elliptic spring. It is of the first importance that the springs should be of the proper degree of stiffness required by the weight of the carriage, and the number of persons they are intended to bear; if too stiff, they will "ride hard," and cause great discomfort; or if they are not stiff enough they will collapse or break. The stiffness is regulated by the thickness of the steel used, the length of the springs, and the width and number of leaves or plats. The body should be set on the springs a little inclined backward, as the tendency is to "run forward" in use.

Shafts. The best wood from which to make shafts is hickory. It is, however, more easily affected by wet than ash or oak. Shafts for light wagons are generally steamed and bent to such form as is required. They should be bowed out widely at the rear, and in front should turn well out from the horse's shoulders. The pole for light wagons should be made of hickory, steamed and bent.

Body. The body frame-work for coaches should be made of soft western ash; the top ribs, of hickory, ash or maple; the panels of white-wood; and roof, of pine-wood deal.

Tops. Enameled leather is now almost universally used for tops, and though less durable than the old-fashioned "oil-top leather," it looks better, being black and brilliant, and is not so apt to shrink.

For the Dash, "grain" patent leather is the best. Its quality may be determined by its pliability. Hard, stiff leather will crack when exposed to heat and cold. The enamel should be smooth and brilliant, and show no "pitting," or unevenness in polish. Good dash leather is jet black, not greyish or reddish black.

Trimming. The most durable material for trimming is cloth; if in high colors, it should be of English manufacture, as in the grade of cloth used for carriages; its colors are more durable than those of French and German manufacture. High colors in American carriage cloth will not stand the sun.

For Stuffing the seats and backs, nothing but the best curled hair should be used. If hair of inferior quality is mixed with it, it will breed vermin, especially in damp situations. Curled hair keeps the seat elastic.

Rules to be Observed in Purchasing Vehicles. — First. Choose for your carriage-maker one who has a character for fair dealing and good work.

Second. Never purchase a vehicle made for two horses with the hope that it will "do" for one horse. Your mistake will be apparent when you find your horse failing from over-work.

Third. Always insist upon "case-hardened," or steel-covered axles. If you have any doubts of their quality, try a file on them. If hard it will make no impression.

Fourth. Insist upon tempered springs, made of English steel. Test your springs by loading the carriage before you buy it, and ascertain what weight they will carry when in use on the road.

Fifth. Examine all iron plates, clips and bolts. If the iron-work is not fitted to the wood with exactness, don't buy the carriage: a poor workman has been spoiling good material.

Sixth. See that the "jacks," or irons conecting the pole or shaft with the axles, are well fitted and sufficiently heavy. If badly fitted they will rattle; if not strong they will endanger your life, if you use the carriage.

Seventh. See that the axles are "set" with exactness. No carriage will be durable, or run with ease, if the axles are not set with mathematical precision.

Eighth. Never select a carriage because it is elaborately finished with silver plate. It soon looks shabby, and requires a great deal of care to keep it in order. Carriages are often elaborately finished to cover up serious defects in the workmanship.

Ninth. Examine closely the painting. A few years' ownership of a carriage will show a greater outlay in making good original defects in painting, than for any other item. If varnish is dull, it generally argues that the painting was hurriedly done. The varnish will "strike in" on bad painting, and a little exposure in bad weather will crack the paint on the wood.

Tenth. Never permit, in the cushions or back, anything but curled hair. Moss soon gets hard.

Eleventh. See that the cloth on the glass frames has been shrunk before it was put on; if not shrunk, the first rain to which it is exposed will draw it off the frames.

Twelfth. See that the door-locks and handles work with ease, and do not rattle. Nothing is more annoying than bad door-locks, or even good locks badly fitted.

Thirteenth. In purchasing a carriage for road use, see that it is made to "track" in the ruts in the district where you intend to use it. There are at least a score of different tracks in different parts of the Union, —varying from four feet four (from center to center of the wheels measured on the ground) to five feet four and a half inches.

Care of the Carriage. Having procured a carriage which has a fine luster, which runs easily and smoothly, and which is generally well finished, it is desirable to maintain it in this condition as long as possible. This requires it to be properly cleansed, oiled when necessary, kept free from dust in the carriage-house, and to have its bolts tightened whenever they have worked loose.

The appurtenances necessary for this purpose are a pail and watering-pot (the water should not be thrown through a hose, as it ruins English varnish, and penetrates all the crevices in the springs, etc., causing rust), two large soft sponges, free from grit, two full-sized chamois-skins, an unlimited supply of water, a wisp-broom, a feather duster (a cloth one will answer), a sheet for covering the whole carriage, a can of sweet oil, or, which is better, pure sperm oil, and a screw wrench. Soft water is much better than hard, as the latter is injurious to the varnish.

All the fine carriages now made being varnished with English varnish, it may be well to call to mind that it has these peculiarities: It will become spotted whenever the mud is allowed to remain long upon it, and the more frequently it is washed, the more lustrous will it remain; hence it is necessary, in order that it may be kept in the best condition, that the carriage should be washed every time it comes in, and at least once a month whether it is used or not.

All freshly varnished carriages should be nicely washed, with soft cold water, four or five times before being used; it hardens the varnish and prevents it spotting by mud. Never place a carriage near stone or brick wall; the dampness destroys the varnish. Varnish requires a well ventilated room. Ammonia from the stable will also destroy varnish in a short time.

The Washing should be done in the following manner:

1. Supposing the top to be sufficiently clean, the cushions and whip removed, the inside of the carriage wiped out, and the curtains fastened down, sprinkle water on the body of the carriage with the watering-pot until all the mud is washed off, by the action of the water alone, without leaving recourse to rubbing, and until you are sure that no grit remains.

2. Wash the whole body with the sponge which is kept for this purpose, using as much water as possible, and rubbing very lightly, continuing the operation until the water runs from the body perfectly clear.

3. Wet the chamois-skin which is used for the body, and wring it out as dry as possible. This will soften it so that it cannot scratch the varnish. Use this to absorb the water which has been left after washing, wringing it out as often as it may be necessary. Continue this until the body is dry. Do not rub it with the chamois-skin, and do not use the skin, nor any substitute for it, when dry and stiff.

4. Pursue this course with the running gear (the wheels, springs, etc.), as has been specified for the body, but lay aside the sponge and chamois-skin which were used for the body, and use for this portion the ones designed for it. Be careful to wash the wheels in such a manner as to throw as little water as possible on the body, and whenever any does strike it remove it at once as before directed. Do not apply soap to any part of the carriage, or even a sponge which has been used with soap, as it will destroy the varnish.

5. Having removed the dirt, and thoroughly dried the carriage, paying particular attention to those parts where the iron is likely to rust if any water is left, rub up the plate with dry chamois-skin kept for that purpose, adding a little dry whiting where necessary, though if the plate is never allowed to become much tarnished there will be little occasion to do more than to rub it with the leather.

6. The top may, when necessary, be washed by the same process as recommended for the body, and with the same care.

Having cleaned the carriage in every part, replaced the cushions and rolled up the curtains, throw a muslin sheet over it to keep dust from it.

If the carriage has not been out since it was washed before, it will only be necessary to wet it thoroughly and dry it as directed.

This is the best method for washing the best carriages. It may be, and in most instances it probably will be, modified to suit the purposes of those who do not care to devote so much labor to this work; and in all such questions of object and expense, the judgment of the individual must establish the compromise.

At least once a month place a wrench on every nut on your carriage. You will thus prevent the loss of nuts and bolts, and preserve your carriage; a loose bolt frequently leads to serious breakage.

As often as once a month, and oftener if necessary, the wheels should be taken off, and the axles and boxes should be thoroughly cleaned, by scraping them with a sharp-edged piece of hard wood, covered with flannel or woolen. They should then, if full-patent axles, receive as much sweet oil, or pure sperm oil, as they will retain without allowing it to work out over the wheel. One tablespoonful to each wheel will be a good quantity.

When the leather-washers are worn out, replace them with new ones. A patent axle running with worn-out washers will soon be good for nothing.

For the half-patent axle, clean lard, or other greases, or any of the patent wagon greases, will be found as effective as oil, and more permanent.

Tire-setting is the most important repair which will be necessary in the case of well-kept carriages, unless they become accidentally broken or worn from long use. This operation should, unless rendered necessary by accident, or improper construction, be performed only in the dryest summer weather, when the wood of the wheel is shrunk to its narrowest limits.

Carriage Steps. No well regulated farm-house fence should be considered complete without a carriage step at the front gate. A cheap form of step is shown in Fig. 7. It is 2 feet 4 inches high, 2½ feet wide, and 3¼ feet in length, and is provided with two steps. Two by 3, or 3 by 3 inch pieces are placed upright at each inside corner, to nail to. This is generally placed at the left of the gate as you enter the yard, and always has the latch end of the gate nearest the step, as it will be far more convenient.

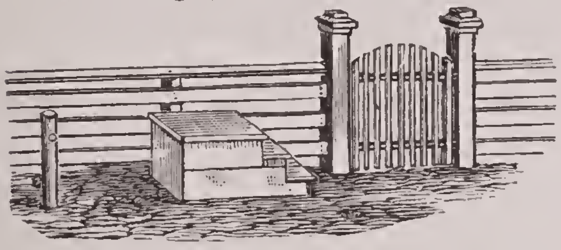


Fig. 7.—*Carriage Steps.*

Carrots thrive best in rather a light loam. The ground should be well manured with fine well rotted or composted manure, 10 or 15 wagon-loads to the acre, and be thoroughly worked quite deep by two plowings at right angles with each other; also roll and harrow. Plant in rows 14 inches apart, and thin plants three to five inches in a row. Plant from middle of April to middle of May, putting in the seed liberally, say eight ounces of seed to 300 feet of row, or about four pounds to each acre. A thousand bushels to the acre might be raised. Carrots are excellent food for horses and cattle.

Varieties. *Long Orange.* The standard field carrot; good for stock.

Short Horn. A standard early variety, sweeter than Long Orange and more solid; good to color butter.

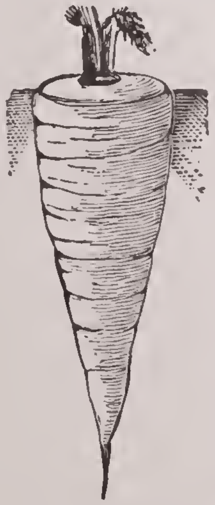


Fig. 1. *Early Scarlet Horn.*

Improved Long Orange. Of a darker and richer color than long orange.

Early Scarlet Horn. The best early short variety for forcing; excellent for the table; very deep orange.

Extra Early Forcing. The earliest and smallest of all varieties; of special value for forcing.

Large White Belgian. Largest of all, white and most productive; good for horses; entire crop can be pulled by hand.

Yellow Belgian. Grows partly out of ground; a capital sort for late keeping.

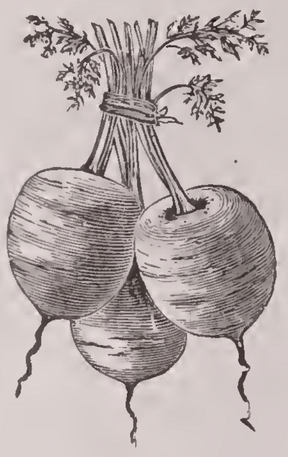


Fig. 2. *Extra Early Forcing Carrot.*

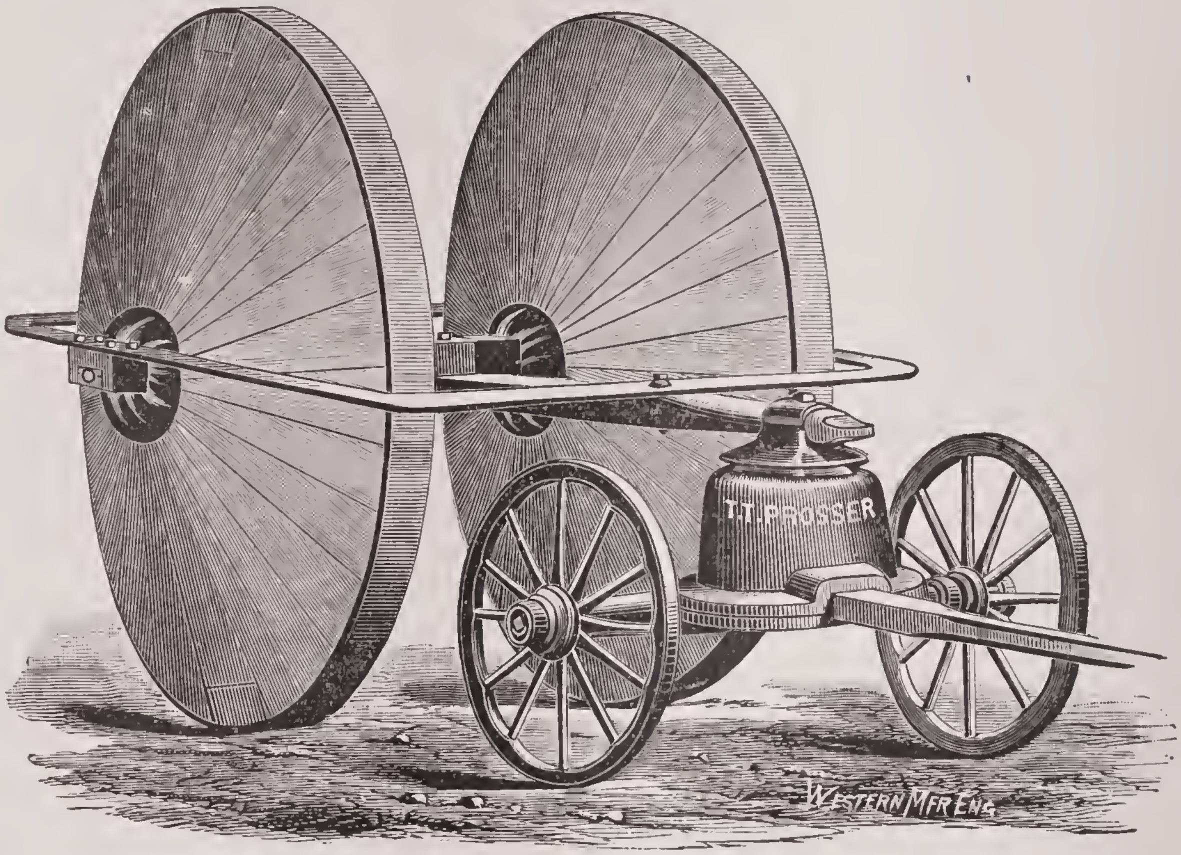
Danvers is a new and promising variety, having the greatest thickness and smallest length of root; easy to dig.

To Cook Carrots, first scrape them nicely; slice them lengthwise; put in cold water, then boil them till tender, and drain the water all off; then season with a little salt, pepper and butter; then take about two spoonfuls of rich milk and flour, not enough for thick gravy; you only want a little. Cut them in slices with a knife. Carrots are good for flavoring soups.

Cart. Mr. T. T. Prosser, of Chicago, Ill., has recently invented a wagon or cart for the use of farmers in hauling their grain to railway stations or elevators, on the prairies and in newer portions of the country where they are not supplied with macadamized or planked roads.

We illustrate on next page this novel grain-wagon, a brief description of which will make its advantages clear to the comprehension of the ordinary reader. Upon the forward axle of the wagon is attached a truncated hollow cone, which takes the place of the ordinary shear, sand board and bolsters. Through this the base of the tongue of the vehicle passes, which is held in nearly rigid position, having a slight perpendicular movement, but no side or horizontal movement independent of the wheels. By this arrangement the weight is relieved from the necks of the team. In the upper end of this cone is set the king bolt, or what takes the place of this article, to which is attached the reach, forming the connection of the carrying cylinders of the wheels. This has a free revolving motion inside the cone, allowing the fore wheels to turn either way to a right angle with the reach or connecting pole. These wheels have a broad, corrugated tire, which not only prevents their sinking in soft ground, but gives them the very best holding capacity in leading the loaded cylinders. It will be seen that this independent action of the fore wheels has another advantage. Should one or both the cylinders or loaded hind wheels get into ruts or soft ground, the entire force of the team may be exerted in a direct transverse draught to extricate first one cylinder and then the other, or both at once.

The cylinders or grain-carrying wheels are intended to be about ten feet in diameter with a tire about 12 inches in width, bellying out to about three feet at the center. Such a pair of cylinders will carry about 150 to 300 bushels of grain, which is three to six ordinary wagon-loads. These cylinders with their load rest directly on the ground, the trunnions bearing no weight, and thus offering no friction except the horizontal force necessary to roll the cylinders. So much has already been said in reference to the difference in the power required to move a given load when resting upon the axles with small wheels, and the same load when resting directly upon the track or ground, that we need not go into that question. It has been demonstrated by experiment that a grain-cart or wagon like the one illustrated, carrying 150 to 300 bushels of wheat, will actually require less power to move it over the same road than an ordinary wagon loaded with 35 to 50 bushels, the usual load on country roads. These cylinders are intended to be made ordinarily of hard wood, with wrought-iron tires and trunnion boxes. The only frame necessary is the light wrought-iron bar passing around the cylinders attached to the trunnions and to the center pole both before and in the rear of the cylinders.



Prosser's Cylinder Grain Cart.

We hardly need refer to the advantages of such a grain cart in hauling a large crop of wheat to the railroad station or warehouse. On many large prairie farms the wheat crop is thrashed out in the fields, cleaned up and moved direct to the station for shipment. One team with one of these grain carts would do the work of four to six teams with four to six wagons and four to six men; or a man with one team would save three days' time and labor each day in getting his grain to market or to a shipping point. In many cases the work of getting the grain to market or to a shipping point comes just at a time when the farmer wants to be at work getting his ground ready for fall sowing, when time is everything, and when the time thus saved in a single season would pay for the cylinder grain-cart.

Carving. To be proficient in this is an accomplishment to be greatly desired. In carving the various kinds of meats and fowls we give the following brief and pointed instructions:

A Roast of Beef. The carving-knife should be rather light and very sharp. Cut the outside pieces thin, and lengthwise of the bone, drawing the knife through with a quick motion, and then lay them in order.

Lay them in order on the platter till there are as many as there are persons to be helped. Then cut the inside meat in the opposite direction, across the bone, laying the slices—cut very thin—in order by themselves. Give each person an outside and an inside piece, but never overload a plate.

Saddle of Mutton. Cut the slices lengthwise from end to end, on each back-bone. If very large divide and give a portion of fat with each piece.

Loin of Veal. Same as sirloin of beef, except that the carver turns the veal over and removes kidney and fat before cutting slices.

Leg of Mutton. Lay it back down; cut the first slice across the lower part about one-fourth of the distance between the knuckle and cramp-bones; then cut the thin part near the thickest until it is sliced to the bone; cut slices toward the thickest part until sliced to the bone; then cut the part near the knuckle lengthwise. The best pieces are the thickest. If any is left let it be the thickest and best part.

Shoulder of Mutton. Lay the back up. Cut the leanest part to the bone across the point. The best are on each side of the blade bone.

Ham. Lay back up; cut thin slices near the middle to the bone; also near the thin end; give bit of fat and lean together.

Roast Pig. If served whole, cut off the head at the neck joint; lay open along the back bone from neck to tail, and lay crackling side down; divide the ribs and help part crackling and dressing to each person. Cut up the head for those who prefer it.

A Fowl. Place the fork firmly in the thick part of the breast; take slices from each side of the breastbone, the whole length of the fowl; unjoint and remove the wings; divide at the first joint. Cut the ligaments of the legs, and twist them out of their sockets, dividing at first joint; cut down the merrythought or wish bone and separate by lifting and pressing backwards; lift up the collar-bones, at each side of the merry-thought, at the broad end, with the knife, and force them toward the breast-bone until they break off; cut through the ribs on each side and remove the breast. Now turn up the back-bone and press the knife firmly across it near the middle, lifting the lower end at the same time with fork, until the bone breaks; then turn the lower end away and remove the bones from each side, by placing the point of the knife on the spot where the side bones are jointed to the back bone. Ducks and prairie chickens are carved in the same way.

Turkey or Goose. Cut as many slices as possible without cutting up the carcass. The rest is like carving fowls.

Case-Hardening, putting a steel surface on iron. It is accomplished by heating the iron in contact with animal carbon in close vesels. The articles are put into a box with animal carbon, and the box made airtight by luting with clay. They are then placed in the fire and kept at a light red heat; in half an hour after the box and its contents have been heated quite through, the hardness will be about the thickness of a dime; in an hour it will be double that, and so on until the desired depth is obtained. The box is then taken from the fire and the contents emptied into pure, cold water. They can then be taken out and dried by riddling them in a sieve with dry saw-dust, when they are ready for polishing.

Cashmere, a rich and costly kind of shawl, made from the soft wool of the Thibet goat. To renovate black cashmere, take about one-half teacup spirits of ammonia to one quart of soft water; then with a soft sponge rub the pieces till thoroughly wet; then roll tightly; when the pieces are all sponged, iron immediately; put the right side of the cashmere next to the flannel; use as hot an iron as possible and iron till perfectly dry. Then use a soft brush to remove flannel lint from the right side.

Cassava (cas'a-va), a starchy food prepared from the poisonous roots of tropical plants. Sometimes kept on sale at groceries. Tapioca is purified cassava.

Cassimere, a thin twilled woolen cloth, used for men's garments.

Caster, or **Castor**, a small wheel fixed to the feet of articles of furniture for facility in moving. At the hardware stores nowadays can be obtained casters so made that they may be screwed to the outside of any furniture leg. They are not only more convenient but also more substantial than the old or common kind. The word "caster" denotes also a vial, cruet, or other small vessel, to contain condiments at the table; also, a stand, to contain a set of such cruets.

Cast Iron: see Iron.

Castor Bean. This is cultivated as a field crop in many sections south of latitude 39°, and will grow very vigorously north of this parallel. It thrives best in a rich, mellow soil, and is easy to raise, as it is planted and cultivated like corn. It grows five or six feet high, and bears 20 to 30 bushels per acre. The beans are taken from the pods, bruised and subjected to a great pressure, by which they yield nearly a gallon to the bushel of "cold-pressed" castor oil, which is better than that extracted by boiling and skimming. The last is done either with or without first slightly roasting. The oil is generally used for medical purposes, as a mild cathartic, but it has even been used as an article of food. Its manufacture into a limpid oil for machinery and lamps, and stearine for candles, has of late been superseded by the products of petroleum.

Castor Oil, To make Palatable. Boil it with an equal quantity of milk, sweeten it with a little sugar, stir it well, and let it cool; beat it up with white of egg; or, envelop the oil with orange or lemon juice in a glass.

Castration, removing the testicles. See Calves, Horse, Sheep and Swine.

Cat. This domestic animal is too well known to require description. Its usefulness upon the farm and in the household for the suppression of rats and mice renders it deserving of mention in these pages. The rule which should always govern a farmer to keep nothing but the best stock should also apply to his cats and dogs. A handsome, well-conditioned cat is an ornament to the kitchen, the porch, or the lawn, and is always noticed by the visitor. A mean, half-starved cat is always a disgusting object. A cat of pure breed is also apt to be the best mouser. The varieties of the domestic cat are neither numerous nor strikingly different. The Tortoise-Shell cat differs from the common variety in color, and is also very elegant. The Angora is a beautiful variety remarkable for its long, silky hair. The Chinese cat has a fine glossy fur, and is remarkable for its pendulous ears. The Chartreuse (shar-truss') is of a bluish color. It is supposed that the Toby has undergone less change by domestication than any other. In this country, the Maltese variety is common and popular.

Insect powder rubbed on the bodies of dogs and cats for the purpose of killing fleas, is apt to get into their noses and eyes when they turn to bite their itching skin. Liquid home-made soap rubbed over their skin is a better remedy. After leaving it on half an hour or so, wash it off clean with warm water, put the dog or cat in a clean place to dry, and then comb down its hair nicely. Kerosene is a far better remedy.

Catalepsy. This is a species of convulsion in which the patient lies perfectly calm, with the muscles partially or totally relaxed. It is brought on, in certain constitutional conditions, by a protracted concentration of the mind or some particular object, and seems akin to other states of the body called "trance," and 'ecstasy." It continues from a few minutes to several days, and used to occur frequently at exciting religious meetings. External sensibility is suspended. During the fit no treatment is required except to keep the patient at a comfortable temperature; but he may be aroused with a careful manipulation and an application of cold water to the face and head. The constitutional and preventive treatment consists in abstinence from sexual and other excesses, and in cultivating sociability.

Catalpa, an ornamental and useful tree, of which there are two species. See Forestry and Landscape Gardening.

Catarrh, mucous flow from diseased air passages, or morbid fluid from other diseased mucous surfaces; also the disease that produces such flow.

There is perhaps no complaint so common as catarrh or cold in the head; it occurs both in winter and summer, and generally the summer cold is more difficult to get rid of than the winter. The attack begins with pains in the limbs and back, tightness across the forehead, repeated sneezing, watery and inflamed eyes, increased discharge from the nose, sometimes inflammation of the throat. Treatment: Wet cloths in cold water, and wring as dry as you can, and apply to the outside of the throat, and wrap a towel around the neck, so as to exclude the air as much as possible. Keep this up during the night for a succession of nights. Also apply some good liniment, rubbing in well two or three times daily. Two parts spirits camphor to one part turpentine makes a very good liniment. Bathe the neck frequently with cold water, and rub dry with a coarse towel. A little cayenne pepper, with saltpeter, dissolved in water, and used as a gargle, is good to allay inflammation. If the throat is raw and sore, dissolve two teaspoonfuls of borate of soda in a teacupful of soft water, and gargle every two or three hours. Smoking dried mullein leaves and exhaling the smoke through the nostrils, and breathing into the lungs, often gives relief. Avoid exposure. In connection with the above, take some good alterative. The following we think excellent: Compound extract sarsaparilla, 4 ounces; fluid extract yellow-dock, 1 ounce; iodide potassium, 2 drams; mix. Dose, one teaspoonful three times a day. Others recommend crushed cubeb berries smoked in a pipe, emitting the smoke through the nose. After a few trials this will be easy to do. If the nose is stopped up so that it is almost impossible to breathe, one pipeful will make the head as clear as a bell. For sore throat, asthma and bronchitis, swallowing the smoke effects immediate relief. It is also a good remedy for offensive breath, and will make the most foul breath pure and sweet. Sufferers from that horrid disease, ulcerated catarrh, will find this remedy unequaled, and a month's use will cure the most obstinate case. Eating the uncrushed berries is also good for sore throat and bronchial complaints. After smoking do not expose yourself to cold air for at least 15 minutes, and let the pipe be a common clay one, new and clean. Let the diet be low, drink toast water, warm gruel, or barley-water acidulated with a little lemon or cream-of-tartar. Bathe the feet at bed-time in hot water. Use the vapor bath, or wrap hot bricks in cloths or flannels dipped in vinegar and water, to the feet and sides. Should the cough be troublesome, take a cough pill or pulmonary syrup. Or, snuff up the nostrils about as much iodoform as would lie on a three-penny piece.

Cat-Bird, a species of thrush, of a leaden color, which is a beautiful singer in spring and early summer, but late in the season, makes only a mewing cry like a cat.

Catch Drain, a large drain to catch the collection of water made by other and smaller drains and convey it to a natural water-course.

Caterpillar, the larva (or worm form) of a butterfly. A general remedy for driving caterpillars away is: Sprinkle upon them a weak solution of chloride of lime, or a strong decoction of rue, wormwood and cheap tobacco: the latter should be applied every morning and evening while the fruit is ripening. See respective fruits and vegetables.

Cathartics, medicines increasing the discharge from the bowels.

CATHARTIC POWDER. Best senna, ginger, camomile flowers, of each 1 ounce; jalap, ½ ounce. Powder fine, and mix well. Take from a half to a teaspoonful in warm water or tea. This is a valuable aperient; it is powerful, and yet mild; effectually cleanses the bowels, and produces a healthy action in them, and also upon the liver. Among the "Hygienists" the most common cathartic is, raw corn meal, mixed with water, in doses from a tablespoonful to a gill; injections of water into the bowels with a syringe.

Catsup, or **Catchup.** There are several ways of making catsups, but to make what every one will like and will keep well, try one of the following, and let the wife or daughter remember she should not permit any thing in the shape of copper, pewter or lead come in contact with the article from which the catsup is made. Only earthenware or stoneware should be used.

TOMATO CATSUP. Cut up ripe tomatoes, boil one hour in their own liquor; strain and press through a hair sieve; to one gallon of juice, add 1 tablespoonful of salt, 1 tablespoonful of black pepper, 1 tablespoonful of cayenne pepper, one tablespoonful of nut-

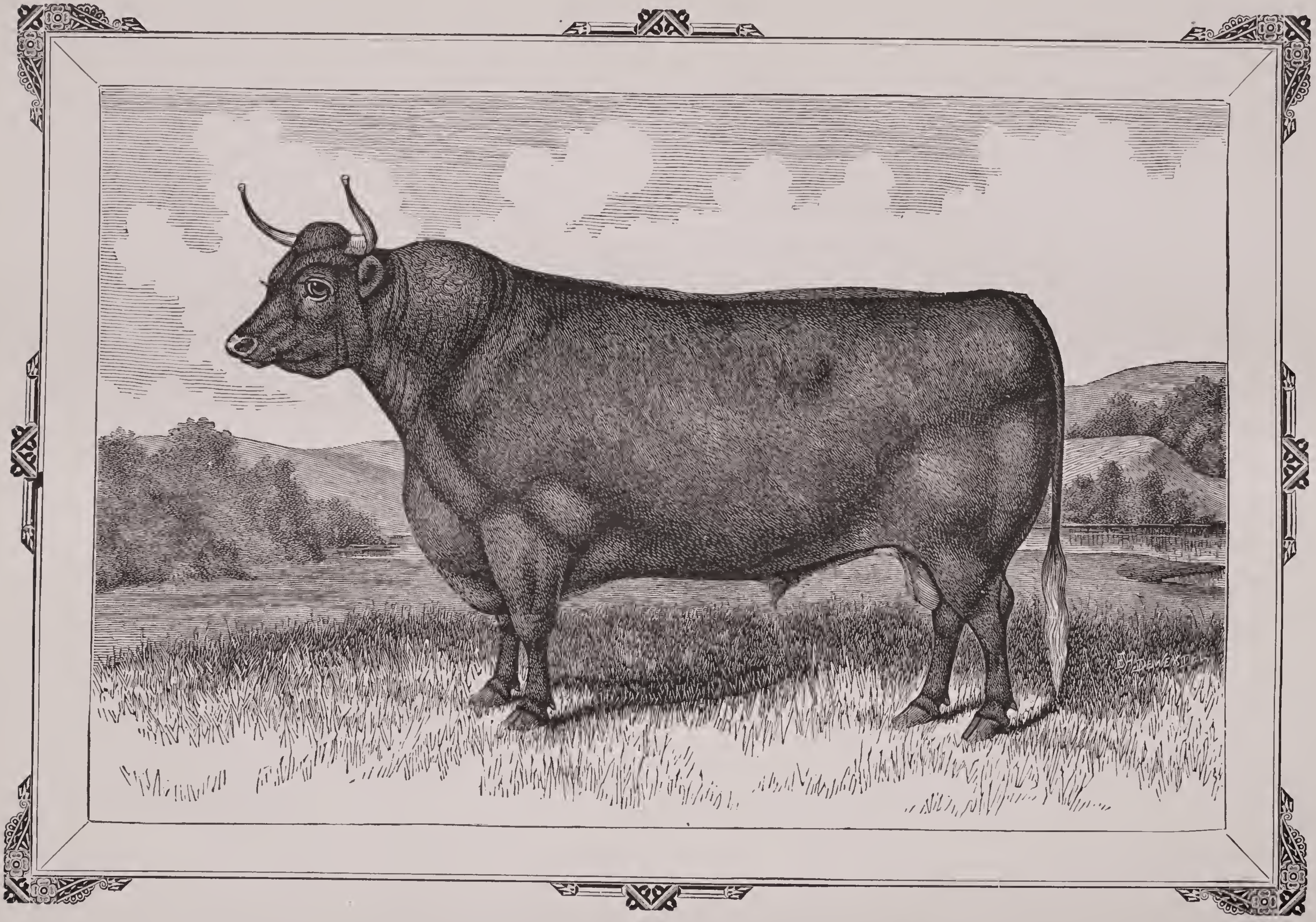


Fig. 1.—DEVON BULL.

meg, two of cinnamon, two of allspice, two of powdered cloves, 1 of mustard and 1 of celery seed tied in a bag, and 1 pint of vinegar; boil until quite thick; bottle and cork while hot; seal with sealing-wax.

Another: Take perfectly ripe tomatoes, ½ bushel; wash them clean and break them to pieces; then put over the fire and let them come to a boil, and remove from the fire; when they are sufficiently cool to allow your hands in them, rub through a wire sieve; and to what goes through, add salt, 1 tea-cup; best vinegar, 1 quart. Put upon the fire again and cook one hour, stirring with great care to avoid burning.

If they were very juicy they may need boiling over an hour.

Green Tomato Catsup. One peck of green tomatoes, one dozen onions, not the largest. Cut the tomatoes up, peel on; stew onions and tomatoes together until fine; strain through a colander, then put on and stew again, with a quart of good vinegar, spices to taste, half-cup sugar, spoonful of salt; put two red peppers in while cooking, then throw away the peppers. When bottled, seal up as any fruit; it is nice.

WALNUT CATSUP. Take green, tender walnuts, prick them in several places, put them in a jar and sprinkle them over with salt and water enough to cover them; let them remain from three to six days; break them and let them remain in the pickle 10 to 12 days; pour off the liquor and cover the shells with boiling vinegar to extract what juice remains in them; crush to a pulp and strain into the liquor. Allow for every quart, 1 ounce black pepper, 1 ounce of ginger, ½ ounce of cloves and ½ ounce of nutmeg, ½ teaspoonful of cayenne pepper and celery seed tied in a bag. Boil for one hour and a half and bottle when cold.

MUSHROOM CATSUP. Lay alternately in a pan the mushrooms and salt; allow half a pound of salt to four quarts of mushrooms, let them remain until next day, then mash them well and let them remain for three days longer; strain, and for every quart of juice allow 1 ounce of allspice, 1 of ginger, a teaspoonful of powdered mace and 2 of cayenne pepper; put into a stone jar, cover closely, and boil in a kettle of boiling water for seven hours; let it stand in a cool place over night, until well settled; pour off carefully from the sediments and put up in small bottles, and seal up air-tight.

OYSTER CATSUP. Chop the oysters and boil in their own liquor with a teacupful of vinegar to every quart, taking off the scum as it rises; boil from three to five minutes and then strain; return the liquor to the fire and add one cupful of sherry wine, some cayenne pepper, one tablespoonful of mace and one of salt to every quart. Boil fifteen or twenty minutes, and bottle when cold.

CURRANT CATSUP. Take 5 pounds of currants, 3 of sugar, 1 tablespoon of pepper, 1 tablespoon of cloves, 1 tablespoon of cinnamon, 1 tablespoon of salt. Steam the pulp and juice of the currants, then add a pint of vinegar and boil half an hour.

Cattle. At the present day all domestic animals of the bovine species are known as cattle, though the signification of the word in former times had a wider range of meaning and applied to all goods and chattels of the farmer and householder, and later to all live domestic animals. The genus *Bos* as a domesticated animal has been the useful and cherished companion of man from the earliest date of history, either sacred or profane. In the fourth chapter of Genesis we are informed that cattle were kept by the early descendants of Adam. The natives of Egypt, India and Hindostan, as well as in other countries, placed the cow amongst their deities, and indeed the traditions of every Celtic nation enroll the cow among the earliest productions, and represent it as a kind of divinity. Oxen have also been used for labor in husbandry, and more or less in commerce, in all countries where neat cattle were kept, and could endure the climate well, as being the most convenient beast of burden. It is probable that they were bred in their best estate by those who used them, and the cows were cultivated for dairy and household uses in the family. As they spread from Asia west and north into the higher latitudes and elevations of Europe, they somewhat changed their characters, and became, as now known there, acclimated and fitted to their new conditions, and inured to the habits of the people who kept them. We may suppose, too, that in the severer climates they were afforded somewhat of shelter, and more pains-taking in food and treatment, than in the milder latitudes where they had long ranged, and with such increased care improved in quality and appearance. They took, possibly, somewhat different shapes, and conformed more or less to the uses to which they were subjected. The Moors of Spain reared great herds of neat cattle, and from them descended the dominant races of Spanish herds. They were there the progenitors of the savage and headstrong bulls still sacrificed in the arena of bull-fights and picadores. The Gauls of France bred the gentler and more economical forms of cattle, adapted to a better husbandry. By what gradual, peculiar, or natural progresses these European cattle acquired their present distinctive characteristics, we have no definite information. History is either altogether silent or obscure on these subjects, and we have no better guide than conjecture to inform us. Throughout Western Europe numerous different breeds exist, of diverse qualities, all more or less useful for the purposes to which they are applied, and profitable to the people who breed and rear them. Italy, France, Spain, Germany, Switzerland, Holland, and other northern countries, all have their peculiar national breeds, while England, Scotland and Ireland have many varieties widely divergent in character and appearance. Indeed, it is not necessary, unless for speculation or curiosity, that we know the particulars of their history or progress, inasmuch as we, in America, are already in possession of the best breeds in Western Europe, fully answering our own immediate purposes, and which have been successfully naturalized on our soil. It has been said, or conjectured, by some speculative antiquarians, that neat cattle were introduced to the continent of America by the Northmen, who are supposed to have made a descent upon the coast from Northwestern Europe some centuries before the discovery of the continent by Columbus. This, however, is simply a conjecture, as no cattle were known here before they were brought out by the Spanish and Portuguese emigrants, a few years after the voyages of Columbus.

We may suppose that cattle were introduced into Mexico as early as the year 1525, and in the mild climate and abundant pasturage which the country afforded, they rapidly increased. As Mexico became peopled and spread her population along the coast, and into the interior, in the course of time Texas was reached, and there were spread the foundations for the immense herds of Mexican, or, as we now call them, Texas cattle. California was afterwards settled by the Spanish Mexicans, who drove their cattle thither and, in time, scattered over it numerous herds. The first English settlement was made in what is now the United States, in 1607, at Jamestown, Va. In 1622 the colony was massacred and broken up by Indians, but as to whether their cattle were destroyed or not history does not state. Soon, however, the colony was re-established and cattle introduced and propagated. The first importation of cattle in New York was made in 1625, by the Dutch from Holland.

In 1620, the English Plymouth colony landed in Massachusetts. In 1623, further English colonies came and settled at Boston and in New Hampshire. In 1624, the first arrival of cattle entered Massachusetts Bay. These were soon followed by other arrivals. New Jersey was settled by the Dutch in 1624, and Delaware by the Swedes in 1627, who brought cattle with them. The early records of New Hampshire state that in the years 1631, '32 and '33, Captain John Mason made several importations of cattle into that State from Denmark, to supply the Danish emigrants who had settled on the Piscataqua river. These Danish cattle were coarse, large beasts, and yellowish in color. Settlements were made in Maryland in 1633; in North and South Carolina in 1660 and 1670; and in Pennsylvania in 1682, all by the English, who either with the first settlers, or soon after, brought cattle over, chiefly from the countries nearest the ports whence they sailed. In all probability, numerous importations of cattle were annually made into the several colonies, during successive years, as the emigrants came in rapidly, and the few early importations, with their increase, were insufficient to supply their wants. That cattle multiplied, both by natural increase and importation, is evident. We see it recorded, that in the year 1636, a party of emigrants went out to settle the town of Northboro, Massachusetts, thirty miles west of Boston, and in a company of one hundred men, women and children, they drove with them one hundred and sixty cattle, and that was but twelve years after the first importation into the colony. From these diverse and miscellaneous beginnings, our native cattle originated. Of what distinctive breeds they were selected, if selected with reference to breed at all, we have no information, nor at this distance of time can we be at all certain. Distinct breeds did then exist, well defined in their characteristics, both in England and Scotland, and we are to presume that, needy and necessitous as the emigrants mostly were—going out for conscience' sake, as many of them did, and in a hope to better their fortunes withal—they paid little regard to breed or race in their cattle, so that they gave milk, performed labor, and propagated their kind. As the merchants of the sea-coast towns grew rich, some enterprising ones made importations of choice breeds from England, which were driven into the country neighborhoods, and very considerably benefited their common stock. Of the improved breeds introduced into the United States the Herefords and Short-horns are deservedly the most popular for beef and early maturity. The Devons as working cattle and in the quality of their flesh are acknowledged to be superior to any other. Of dairy cattle the Ayrshire originally brought from Scotland, the Jersey from the Channel Islands, and the Dutch and Holsteins from Holland and Holstein, have merits of exceeding excellence. The Ayrshire and the Dutch and Holsteins are noted for large messes of milk, rich in caseine, and the Jersey and Guernsey as cows giving milk exceedingly rich in cream and consequently in butter.

Of late, however, the importations to this country have been limited to a few well known breeds, each having desirable characteristics. The breeding of these and the improvement of the natives by intermixture with them is the present enthusiastic work of the American cattle fancier. While every farmer can not be an importer, still every farm must have its cattle of some kind, and the raiser can, in a few years, have a herd of high grades with a few pure bloods at a very little expense over that of keeping up his herd of natives or "scrubs."

Increased prices per pound, and more pounds of beef cattle to sell annually, will be the speedy result. He should be a breeder of cattle to the extent at least of keeping one bull of pure blood.

This will serve a large number of native cows. The progeny of these, called "grades," will show a marked improvement upon their dams, having to a greater or less extent the characteristics of the pure bull. The heifers of these grades should be kept for breeding purposes, and the bull calves be castrated and reserved for oxen or fattening. When the heifers arrive at a proper age, two years, for breeding from, the parent bull should be sold or exchanged, and another of the same breed procured. The second generation of grades will be a great improvement upon the first, approaching more nearly the desirable characteristics of the pure breed of the bulls. This process may be continued indefinitely, and in a few years the farmer will be the possessor of a herd of cattle as good as the pure bloods, except for breeding perfectly pure bloods. His beef cattle will bring the

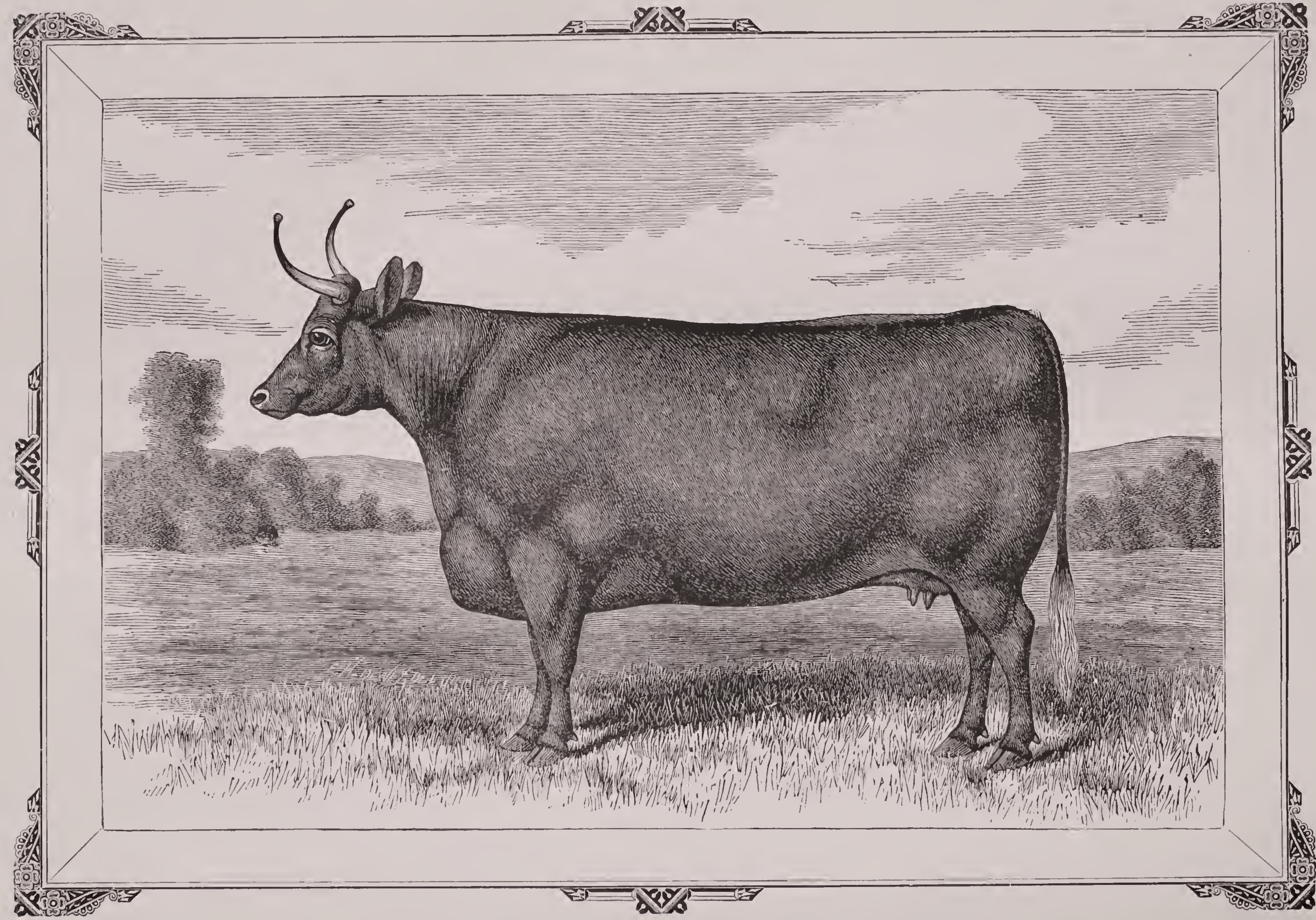


Fig. 2.—DEVON COW.

highest prices in the market, or if he is breeding for dairy purposes, his herd will possess the qualities of pure bloods to which the bulls belong. If possible, however, the farmer should, in addition to the improvements of the natives, procure one or more pure-blood cows of the same breed as the bull, and make the beginning of a herd of thoroughbreds. If he desires to make a specialty of cattle-breeding, either for beef or dairy purposes, he must, of course, be governed in his selection of a breed or breeds by the specific qualities of each. The following are all the varieties bred in this country, given alphabetically. We also must fully treat the breeding, care and management of cattle, the manner of diagnosing for diseases, and treat in the most practical and modern manner all of the diseases and ailments which this stock is heir to in this country. This portion of the work will be found especially valuable, as it is given in the simplest and most common-sense way, and no remedy prescribed but has been thoroughly tested. Also, as far as possible such remedies were given as the farmer may have on his place, or to be easily obtained and easily administered. For the selection, care, management and treatment of the cow, see article on Cow, for calf, see Calves, for bull, see Bull, and for oxen, see Oxen. For the laws and principles of breeding, see article on Breeding.

ALDERNEYS. The original stock of the Alderney breed was from Normandy, France. Between England and France, in the British Channel, are the islands of Jersey, Alderney and Guernsey. These islands have given names to as many breeds of cattle, though they are nearly all identical, and of the same Norman, or French extraction. In describing the Alderney breed, a portrayal of the Jersey and Guernsey breeds is really given, though from the fact that the shipment to this country of Jersey stock has been very large of late years, the latter name has become best known here as applied to the Alderney breed of cattle. The pure-blood Alderney cattle are now found in England mainly in gentlemen's parks, and it is thought fashionable that the view from the drawing or breakfast room of the house should present an Alderney cow or two grazing at a little distance. In color the Alderneys are light red, yellow, dun or brown colored; short, wild-horned, deer-necked, thin, and small-boned; irregularly, and often very awkwardly shaped. Their size is small; the bellies of many of them are four-fifths of their weight; the neck is very thin and hollow; the shoulders stand up and are the highest part; they are hollow and narrow behind the shoulders; the chin is nearly without flesh; the hocks are narrow and sharp at the ends; the rump is short; and they are light and narrow in the brisket. This is a description of the pure Alderney, as seen to-day in England, and does not adequately apply to the Jersey stock as latterly improved on their native island.

The Alderney has a voracious appetite and yields but very little milk, but it is however of excellent quality, and yields more butter per quart than can be obtained from any other cow, though some writers deny this.

AYRSHIRES. This breed of cattle originated in the county of Ayrshire, Scotland, which extends along the eastern coast of the Frith of Clyde, and the North Channel. The climate of the district is moist and mild, and eminently adapted to the pursuit of dairying, and the production of dairy stock. A well informed Scotch writer thus describes the Ayrshire cattle:

The shapes most approved of are: Head small, but rather long and narrow at the muzzle; the eyes small, but smart and lively; the horns small, clear, crooked and their roots at considerable distance from each other; neck long and slender, tapering toward the head with no loose skin below; shoulders thin; fore quarters light; hind quarters large; back straight, broad behind, the joints rather loose and open; carcass deep and pelvis capacious and wide over the hips, with round fleshy buttocks; tail long and small; legs small and short, and firm joints; udder capacious, broad and square, stretching forward, and neither fleshy, low hung, nor loose; the milk veins large and prominent; teats short, all pointing outward, and at considerable distance from each other; skin thin and loose; hair soft and woolly. The head, bones, horns and all parts of least value, small, and the general figure compact and well proportioned. In color they are not uniform, but red and white, brown and white, and black and white predominate. Small red, black or brown spots, on a white ground, is perhaps a more uniform mark than any other, though in many cases red predominates. The cows especially have small heads and horns, light necks and shoulders, deep flanks and heavy hind-quarters, with all the marks of deep milkers. The Ayrshires are essentially a dairy breed. Though the milk of the cows is not especially rich in cream, like the Alderneys and Holsteins, yet in all other respects their milk is equal to the best; is of average richness in cream; and the breeders of Ayrshire cattle claim that the quantity of milk produced by their favorites exceeds that of any other breed of dairy stock. Large numbers of Ayrshire cattle are bred for dairy purposes in the United States with satisfactory results. Though most highly valued for their milking qualities, the Ayrshire fattens well and easily—an important item in the final disposal of the cows.

THE DEVONS. The native country of the Devons, and where they are found in the greatest purity, is the district skirting the Bristol Channel, England, from the river Taw westward. They belong to the middle-horned group and are of symmetrical form, of medium size, and red in color. They are good milkers, and their flesh is of fine quality. When well bred they are the most beautiful of farm animals, and the steers are susceptible of training to be excellent oxen. The perfect specimens of the Devon bull are admired for their rich red color, their fine clean heads, adorned with long, up-turned horns, shapely and of a yellow hue. The cows are not considered very profitable for dairy purposes, but there are exceptions. They certainly give very rich milk. The Devon ox has his legs placed well under the chest, and they are straight in the best herds. The fore arm is particularly large and powerful. It swells out suddenly above the knee, but is soon lost in the substance of the shoulder. Below the knee the bone is extraordinarily small, but the smallness is only in front, and in the bone, not in the sinews and muscles; the leg is deep, and the sinews far removed from the bone, indicating both strength and speed. The leg is rather long, which is necessary to a working animal. The line of the back is straight from the withers to the tail. The hips are high and on a level with the back, and the space from the hip to the point of the rump is long and well filled up. The setting on of the tail is high and level with the back, and the tail is long, small and tapering. The skin is thin, and the appearance of thickness that it sometimes bears arises from the curly hair which covers it when the animal is in good health and keep; the curled hair also indicates purity of blood. In selecting an ox of the Devon breed the paler color should be avoided, as they are less hardy than the reds. One peculiarity of the Devon breed is the smallness of the bulls and cows in comparison with the oxen. The bull is smaller than the ox, and the cow than the bull. This has been an annoyance to breeders. The cows, however, although small, possess that roundness and projection of the two or three last ribs which make them actually more roomy than a careless examination of them would indicate. The cow is particularly distinguished for her full, round, clear eye, the gold-colored circle round the eye, and the same color on the inside skin of the ear. The countenance is cheerful, the muzzle orange or yellow, the jaws free from thickness, and the throat from dewlap. The points of the back have more of roundness and beauty, and are freer from angles than most animals. The Devon cattle were formerly great favorites with the New England and Middle State farmers, on account of the working qualities of the oxen, and the easiness of their keep. But latterly milking qualities are more largely sought, and the Devon ox has been superseded by the horse. Many farmers, however, value the Devon for crossing with other breeds.

To represent the Devon stock we have selected two of the finest specimens of the breed in America. The Devon bull as shown by Fig. 1 is a likeness of the celebrated bull Shelto 2nd, owned by L. F. Ross, Avon, Ill. The cow, Henrietta (Fig. 2), was formerly owned by the same gentleman, who is one of the leading breeders of this stock in America.

DUTCH FRIESIAN. This breed is identical with the Holstein, which we describe at length. It is claimed that the name of Holstein is incorrectly applied. It has become popularized and more common than the correct name, as it is claimed, the Friesian. Two herd books of this breed are kept in this country, the Holstein and the Dutch-Friesian. There is at present a controversy going on in this country between the breeders of the Holstein and Dutch-Friesian cattle as to whether the latter shall be admitted under the name of Holstein and to compete with them at the State and county fairs. As a magnificent representation of the Dutch-Friesian we show by Fig. 3 a picture of Sjoerd, a cow owned by H. Langworthy, West Edmeston, N. Y.

GALLOWAY CATTLE. This breed is a native of the shires of Kirkudbright, Wighton, Ayrshire and Dumfries, which were embraced in the ancient province of Galloway, Scotland. They are hornless and are therefore called "polled," "dodded, "humble" or "muley" cattle.

They have always been favorites with English farmers, because they fatten easily, attain large size, their flesh loses no fineness because of size, and they manifest a kind and docile disposition. They are straight and broad in the back, round in the ribs, and broad in the loins, without any projecting, hooked bones. In roundness of barrel and fullness of ribs, they will compare with any breed. They are long in the quarters and ribs, deep in the chest, but not broad in the twist. There is less space between the hips and ribs than in most other breeds, a consideration of importance. The Galloway has short legs, with a clean short shank. They are not fine and slender, but well proportioned and clean in the neck and chaps. The neck of the Galloway bull is thick almost to a fault, the head is rather heavy, the eyes not prominent, the ears large, rough, and full of long hairs on the inside. These cattle are covered with a loose, mellow skin of moderate thickness, which is clothed with long, soft, silky hair. The prevailing color is black, a few are of a dark, brindle brown, and a few speckled with white spots, and some of a dun or drab color. The cows are not good milkers, but though the quantity of the milk is not great, it is rich in quality, and yields a large proportion of butter. The Galloway cattle have never been largely introduced into this country, a few having been imported and crossed with other breeds. Probably many of the "polled" cattle here and there seen mingled with the herds of this country have received their hornless traits from the Durham, or Short-horned cattle, that have been imported from England, the Galloways having been considerably crossed with that kind of stock by Charles and Robert Colling, breeders of Durham, England. A singular trait of the Galloway, or polled cattle, is an occasional horn that hangs from the brow of individual members of this breed. It is dependent from the frontal bone, and is not attached to any bone of the head, but grows from the skin and hangs down on the side of the face.

GUERNSEYS. The Guernseys, as a breed, are identical with the Alderneys and Jerseys, though they are somewhat larger than the former. Their general characteristics are described in the articles on the Alderneys and Jerseys. They derive their names from the Island of Guernsey, one of the British Channel group.

THE HEREFORD. These cattle derive their name

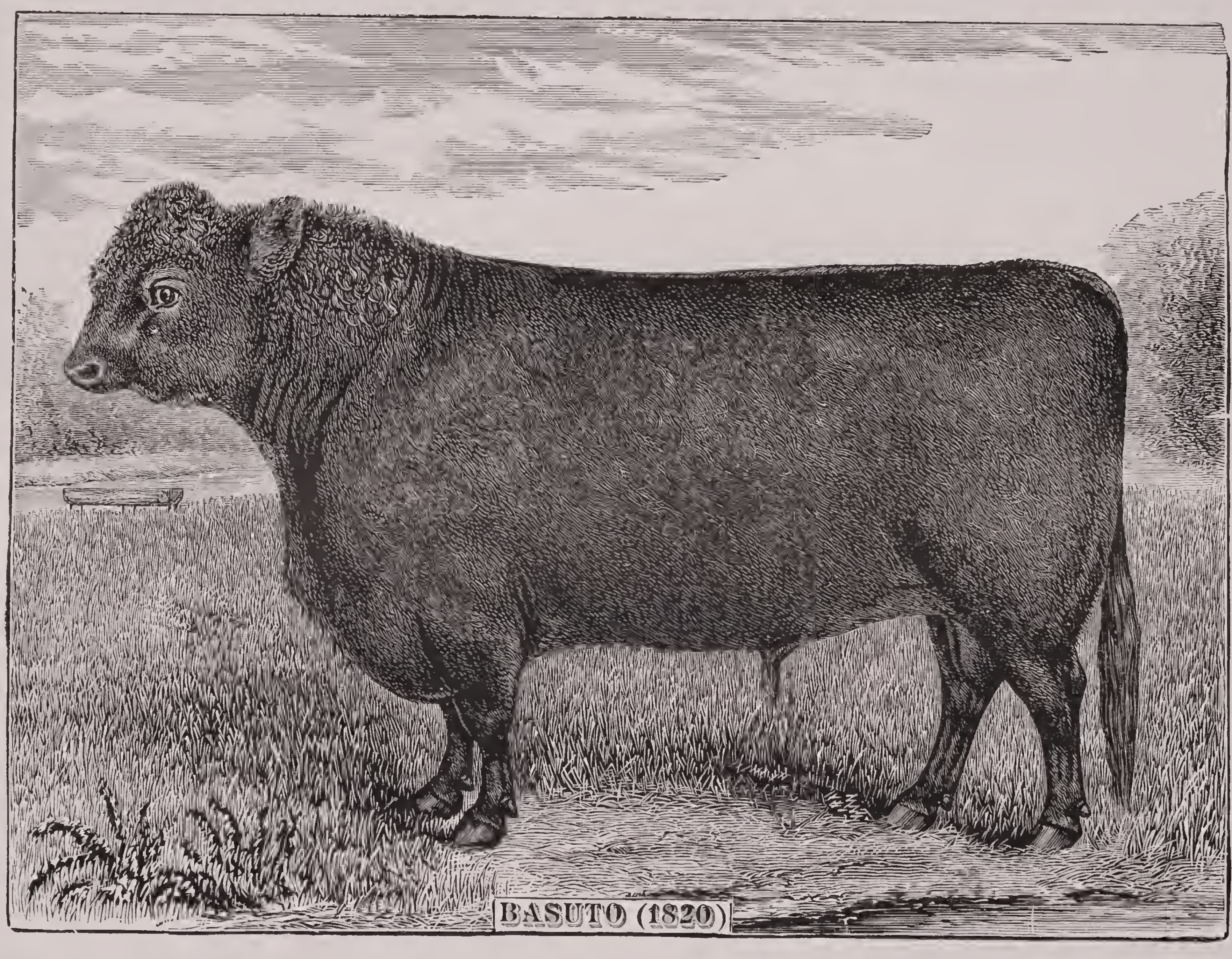


Fig. 13.—ABERDEEN, OR ANGUS POLLED BULL.

from a county in the western part of England. Their general appearance is marked by a white face, sometimes mottled; white throat, the white generally extending back on the neck, and sometimes, though rarely, still further along on the back. The color of the rest of the body is red, generally dark, but sometimes light. Eighty years ago the best Hereford cattle were mottled, or red all over, and some of the best herds, down to a comparatively recent period, were either all mottled, or had the mottled or speckled face. The qualities of the Herefords are described thus: The expression of the face is mild and lively; the forehead open, broad and large; the eyes bright and vivacious; the horns are glossy, tapering and spreading apart, the head small; chap lean; neck long and tapering; chest deep; breast-bone large, prominent and very muscular; shoulder-blade light, and shoulder full and mellow in flesh; brisket and loins large; hips well developed, on a level with the chine; hind quarters long and well filled in; buttocks on a level with the back; tail slender and well set; hair fine and soft; body round and full; carcass, deep, well formed, and cylindrical bones small; thigh short and well made; legs short and straight, and slender below the knee; as handlers, mellow to the touch on the back; skin soft, flexible, of medium thickness, rolling on the neck and hips; hair bright; and face almost bare, which is characteristic of pure Herefords. The Herefords belong to the middle-horned division of the cattle of Great Britain. They are noted for their fattening qualities, and take on a much greater weight than the Devons; and, though their size makes them good draft oxen, they are slower than the Devon. The ox fattens speedily, at an early age. The cows are not so good milkers even as the Devons, and a dairy of Herefords is rarely to be seen. They are an aboriginal breed, and descended from the same stock as the Devons. In point of symmetry and beauty of form, well-bred Herefords may be classed with the improved Short-horns, though they arrive somewhat more slowly at maturity, and never attain such weight. Their beef in England commands the highest price, except, perhaps, that of the West Highlanders, but they are far less spread over England than the improved Short-horns. They have been to some extent imported into this country, and several fine herds exist in different sections. The earliest importations were made by Henry Clay, of Kentucky, in 1817. Some difficulty is experienced with Hereford cows, following the dropping of their calves, especially if they are feeding on luxuriant grass, on account of the swelling of the udders. This can be obviated by letting the calves run with the cows and suckle them four to six months. This method would be very objectionable to the dairymen but could be practiced by the stock breeder. As a fine illustration of this stock we give a picture of the famous Hereford bull, Success (Fig. 4), the property of T. L. Miller, Beecher, Ill. The Hereford cow shown by Fig. 5 is Princess B., owned by G. S. Burleigh, Mechanicsville, Iowa.

THE HIGHLANDERS. This breed is indigenous to Argyleshire, Scotland. The animals of this variety are famous for their hardiness, and are highly prized for the excellence of their flesh. The West Highland cattle are universally adapted for grazing farms in Scotland, but are seldom employed in the dairy. They have not been introduced into this country to any great extent.

THE JERSEYS. These cattle have become widely known and quite popular among American dairymen. As elsewhere indicated, they were originally identical with the Alderneys and Guernseys, and explanation of their origin and ancestry can be found in the paragraph under the head of "Alderneys." The head of the pure Jersey is fine and tapering, the cheek small, the throat clean, the muzzle fine and encircled with a light stripe, the nostrils high and open; the horn smooth and crumpled, but not very thick at the base, tapering and tipped with black; ears small and thin, deep orange color inside; eyes full and placid; neck straight and fine; chest broad and deep; barrel bodied, broad and deep, well ribbed up; back straight from the withers to the hip, and from the top of the hip to the setting of the tail; tail fine, at right angles with the back, and hanging back to the hocks; skin thin, light color and mellow, covered with fine soft hair; fore legs short; straight and fine below the knee; arm swelling and full above; hind quarters long and well filled; hind legs short and straight below the hocks, with bones rather fine, squarely placed, and not too close together; hoofs small; udder full in size, in line with the belly, extending well up behind; teats of medium size, squarely placed and wide apart, and milk-veins prominent. The color is generally cream, dun or yellow, with more or less of white, and the fine head and neck gives the cows and heifers a fawn-like appearance, and make them objects of attention in the parks. The prevailing opinion as to the beauty of the Jerseys is based on the general appearance of the cow while in milk, no experiments in feeding for beef having been made public, and no opportunity to form a correct judgment from actual observation having been furnished. As an illustration of this stock we give a cut of one of the finest specimens in America. She is owned by Messrs. Hoover & Co., Columbus, Ohio, and has been christened the Pride of Eastwood. She is represented by Fig. 6. We represent by Fig. 7 a fine Jersey bull, owned by Geo. Jackson, of Ingallston, Ind.

THE LONG-HORNS. Though this breed of cattle is but little known in America outside the books, it holds an important place in Great Britain, and our treatment of horned stock would not be complete without a description of it. The Long-horns were first known in Craven, a fertile corner in the West Riding of Yorkshire. They were distinguished from the home-breds of other counties by a disproportionate and unbecoming length of horn. In the older breeds this horn frequently projects nearly horizontally on either side, but as the cattle were improved the horn assumed other directions; it hung down so that the animal could scarcely graze, or curved so as to threaten to meet before the muzzle, and so, also, to prevent the beast from grazing; or immediately under the lower jaw, so as to lock it; and the points often presented themselves against the bones of the nose and face, threatening to perforate them. When the breed was improved the horns lengthened. These cattle have become spread throughout the midland counties of England.

The Holstein. The Holstein breed of Dutch cattle, now largely bred in North Holland, has been greatly improved in the last century. The earliest British writers say very little about this breed, but some have asserted that the Short-horns were greatly improved by the Dutch admixture. It is a fact that there is a great similarity in form and character between the Short-horn and Dutch cattle; but there is sufficient distinction to show that for centuries past each kind has been bred for different purposes. It must have been more than a century, perhaps two, since material improvement was begun in Dutch cattle. The Holsteins are noted for their surpassing excellence in milking qualities, coupled with large size, compact, massive frame, capability for making good beef, and for the strength of the oxen. In color they are black and white, spotted, pitted or mottled. The lacteal, or milk-producing formations are wonderfully developed, which makes the breed permanent in the dairy. It is but recently that this valuable variety of cattle was introduced to any considerable extent in this country. The late Mr. Wm. Jarvis, of Wethersfield, Vt., the noted breeder of Merino sheep, early in the present century imported a bull and two cows, placed them on his farm and bred them successfully for a number of years. Heman Le Roy, a New York merchant, in 1820 and 1825, imported some improved Dutch cattle and kept them on his farm in the vicinity of the city. Some of this stock was afterwards kept on the farm of Rev. A. Le Roy, near the Genesee river. They produced fine cattle, but in the herds of both gentlemen the pure breed was lost and none but grades were left after a few years. In 1852 a single cow was imported by Winthrop Chenery, of Boston. This arrival was followed by successive importations until 1859, when the cattle plague having broken out, all foreign cattle were killed pursuant to an act of the legislature, for the prevention of the spread of the contagion. In 1861 Mr. Chenery made another importation, and since that time the Holstein stock have been bred successfully in this country, and have considerably multiplied. This stock has been long bred to develop their milk-producing qualities. They are quick feeders, and turn their food readily to milk. Their faculty to lay on flesh is satisfactory, and as workers the oxen will rank with other heavy cattle of like quality. The Holsteins have grown in favor with stock-breeders throughout the West, and many fine herds can now be found upon the farms of Illinois and other States.

Fig. 8 represents the cow Aagie, a magnificent specimen of the Holstein breed. She is owned by the Smiths & Powell, of Syracuse, N. Y. At six years of age her milk record was 18,004 pounds and 15 ounces for the year. We also give an illustration of a Holstein bull, Fig. 9, owned by Severy & Sons, Leland, Ill.

Native Cattle. For many years of the early history of this country, even down to a quite recent period, the native herds of the United States were unmixed with the pure-bred cattle of Europe; and to-day a large proportion of the bovine stock of the country are native cattle, unimproved by the blood of thoroughbred animals. Our native breed (if breed it may be called) originated from a variety of sources. Each company of colonists that settled on our shores brought with them individuals of their own native cattle, and these became mingled as time passed, and finally merged into the common stock that is now known as "native." The Spanish conveyed their breeds to Mexico; the Dutch theirs to New York, which produced cattle of a fair size, but roughly formed; the Swedes brought herds to Delaware; the Huguenots, French domestic animals to their country, and the English their favorite breeds to the places on our coast where they first settled. The Devons and Herefords were early settlers in New England, and in due time the Short-horns of Lincolnshire, and the Long-horns of Lancashire, the polled or hornless cows of Suffolk, and possibly the Galloways of Scotland followed, the latter hornless breeds being brought to Long Island and New Jersey. Gradually the population spread into the interior, the domestic animals of the farmers of course increasing in numbers with the pioneers' progress. The rugged nature of New England caused oxen to become the favorite draft animals in that section, and the Devons early became the favorites for that kind of service, the Herefords also being well thought of for oxen. The south branch of the Potomac is bordered with broad, rich lands, and this section early became famous for fine cattle. Cattle were always a secondary object in the South, and even to this day a large preponderance of inferior stock prevails there; yet the Blue-Grass region of Kentucky is noted for its large product of improved Short-horns. Texas cattle may be classed as native stock, but their peculiar character demanded their separate treatment elsewhere in this article. Improved breeds of cattle are rapidly superseding the old native stock, either by pure breeding or by crossing. The rich lands of Ohio, Indiana, Michigan and the prairie States of the farther Northwest, are becoming well stocked with improved breeds.

Polled Angus, or Aberdeen. By some in this country there is a tendency to confound the Angus with the Galloway. The Galloways, however, are natives of a different part of Scotland and claim no relation to the Anguses; their hair is longer and their hides thicker; their eyes not so full and their heads heavier.

This breed of cattle, like the Galloways, is of Scotch descent, and is extremely hardy and particularly adapted to a severe climate. They are considered good breeders and prime beef-producers. The milking quality of the breed is of a high order. It is claimed they will breed until their twentieth year. They are being extensively introduced in the United States for dairy and beef purposes, and for such have no superiors.

Red Polled. This is a breed of polled, or hornless, cattle now being introduced into this country. We give on this page an excellent likeness of a pure Polled Norfolk bull and cow. These were imported by G. F. Taber, of Patterson, N. Y., in 1873. These are different from the Galloway and Angus breed of Polled cattle, but are more like the Jersey. They occupy front rank as milkers, and must prove a valuable stock for the dairy. Gen. L. F. Ross, of Avon, Ill., is attempting to establish a herd of Red Polled cattle as nearly like the Devon as possible.

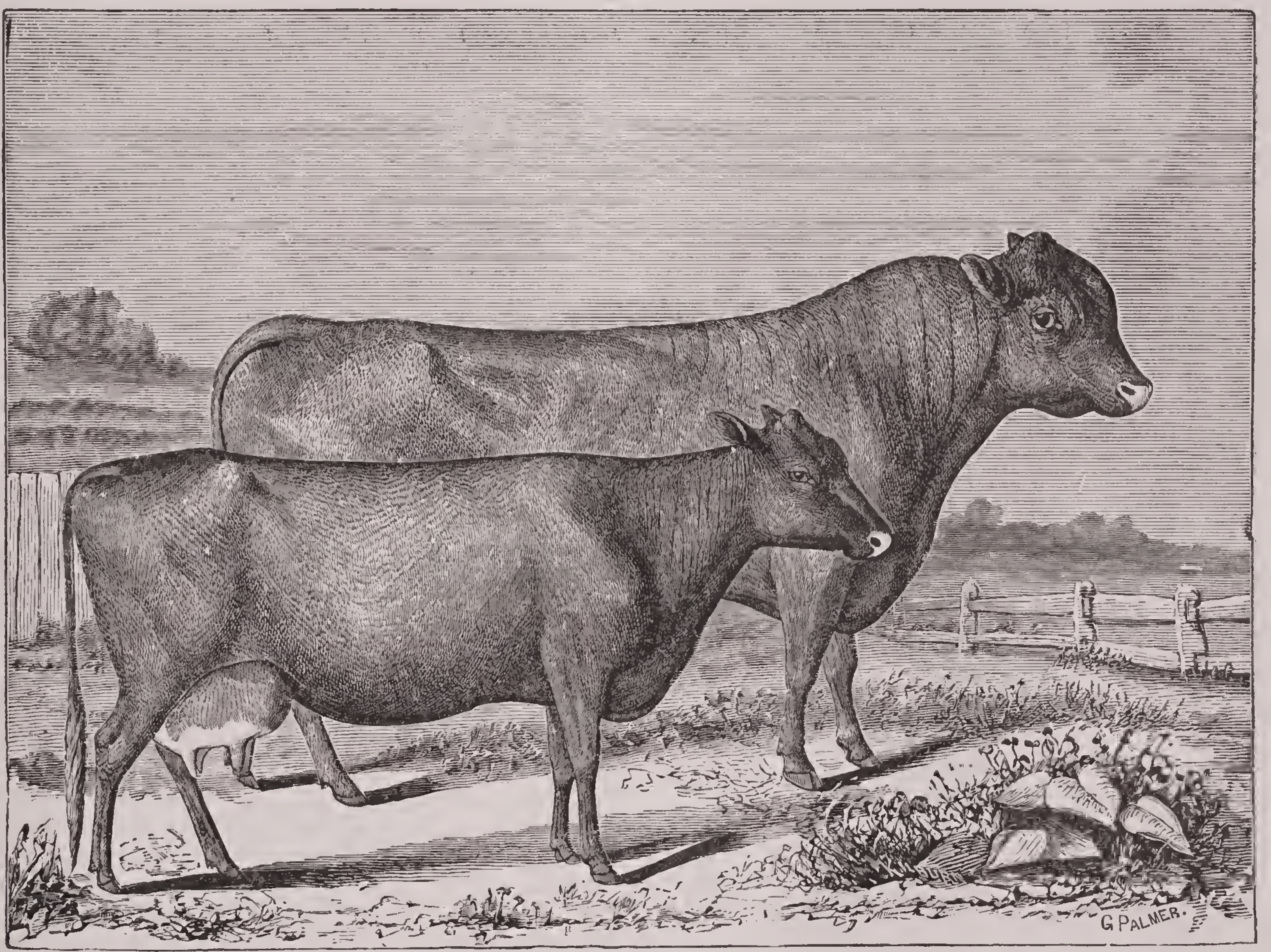


Fig. 10.—*Red Polled Cattle.*

Short-Horns. Probably more of this breed of cattle are grown in the United States than any other of the distinct, high-breed varieties. The race is susceptible of breeding for the production of milk, as several families show, and great milkers have often been known among pure-bred animals, but it is more common to find them bred mainly for the butcher; in fact, the Short-horn variety is peculiarly a beef-producing kind, and is for that reason highly esteemed in the Western States, and fattens rapidly and profitably on corn, which is so abundantly produced in this region. This makes the Short-horn cattle the most important stock to the Western farmer. There is a dispute among the most eminent breeders as to how far the Short-horns owe their character to the early importations from Holland. Durham and York counties, in England, have for more than a century been famous for their Short-horns, and they were once known as the Teeswater breed. They were of large size and extraordinary milkers. This stock was improved by crossing with the Galloways. It is said that toward the close of the seventeenth century bulls from Holland were introduced into Durham, and the blood of Dutch cattle was thus mingled with that of the Teeswater stock, giving to our present Short-horns much of that trait of squareness of buttock and readiness to take on flesh that now distinguish the famous variety. However the present breed may have been derived, none could be better adapted to meat-producing, which is more important to the American farmer. The desirable traits of the Short-horn bull may be summed up, according to the best breeders, as follows: He should have a short, but fine head, very broad across the eyes, tapering to the nose, with a nostril full and prominent; the nose should be of a rich flesh color; eyes bright and mild; ears somewhat large and thin; horns slightly curved, and rather flat, well set on; a long, broad, muscular neck; chest wide, deep, and rather projecting; shoulders fine, oblique, well formed into the chine; fore legs short, with upper arm large and powerful; barrel round, deep, well ribbed horns; hips wide and level; back straight from the withers to the setting on of the tail, but short from hips to chine; skin soft and velvety to the touch; moderately thick hair, plentiful, soft and mossy. The cow has the same points in the main, but her head is finer, longer, and more tapering; neck thinner and lighter, and shoulders narrower across the chine. In sections where the climate is moist, the food abundant and rich, some families of the Short-horns may be valuable for the dairy; but they are most frequently bred in this country exclusively for beef, and in sections where they have attained the highest perfection of form and beauty, so little is thought of their milking qualities that they are often not milked at all, the calf being allowed to run with the dam. This practice is more common with the stock-growers of the West.

As a fine specimen of the Short-horn breed we refer the reader to Fig. 11. This cut represents the Short-horn cow, Lady Aberdeen 3rd, owned by the Canada West Farm Stock Association, Brantford, Ont. This animal won the prize at the Fat-stock Show, Chicago, in 1881, in sweepstakes of any age or breed.

Texas Cattle. The large number of Texas cattle that are now grown in the Lone Star State, and in New Mexico, and find their way to seaboard markets, makes it important that a description of this peculiar breed be given in these pages. The Texas cattle are descendants of the old Spanish stock that were brought to Mexico and the other Spanish-American colonies. This ancient breed is thus described: They are about the size of our native cattle of forty and fifty years ago. They have large, coarse, long, wide-spread horns, mostly with a half or a full twist to them, and set back rather than forward, and the points turned outward. Their color is black, dark brown, reddish brown, light yellowish red, with some white on the throat and belly, with occasionally a dark roan or dark gray. The cows are nearly as large as the oxen, with the same style of horn. They are not good milkers. Their heads are long and rather fine. Herdsmen attend to them in droves, like the short-haired Scotch Colleys. In this description may be detected the origin of the Texas cattle, the latter having run wild for many generations, while the former are thoroughly domesticated. Texas cattle are a half wild race, and are made to serve the purpose of beef production through the persevering mastery of the herdsmen. Vast numbers of this variety of animals have for a century or more been herded by the Spanish inhabitants, and of late years American herdsmen have taken up the occupation, and have developed the Texas stock business to an enormous degree. The building of numerous trunk lines of railroad from the seaboard to the Missouri river, and reaching down into Texas and New Mexico, has given stimulus to cattle production in those regions, and at present there seems to be no limit to the extension of this industry. It is customary for the ranchman, as the owner or "herder" of a flock is called, to seek a place for his cattle that possesses the advantages of both pasturage and water. Here he locates his "ranch" (house or farm), sometimes purchasing, and sometimes only taking temporary possession of the premises. He generally provides a "corral," or yard in which to confine stock when necessary, but his farm implements are small, and most of his capital is invested in cattle. Once a year the herd is rounded up for identification, branding, and selecting out such as are fit for sale. The pure Texas breed is described as follows: They are tall, lank and bony, coarse-headed, with enormous horns. Their legs are long and coarse; they have much dewlap and little brisket; they are flat-sided and sway-backed; high in the flank, with narrow hips and quarters; have much offal in proportion to their consumable flesh, and are coarse all over. Their meat is necessarily tough, stringy and of coarse quality. A good lot of Texas steers, fattened for the market, will average from 1,000 to 1,200 pounds in weight. The color of Texas cattle is red, dun, yellow, brindle and roan, all mixed more or less with patches and stripes of white. Attempts have been made from Kentucky to improve the native Texas stock by crossing with Short-horns, but little has been done because of the wild and vagrant habits of the former. The plague has been a great bane to growers of Texas cattle, and legislation has been invoked on several occasions to prevent the carrying of infected animals into or through other States, so as to prevent the spread of contagion.

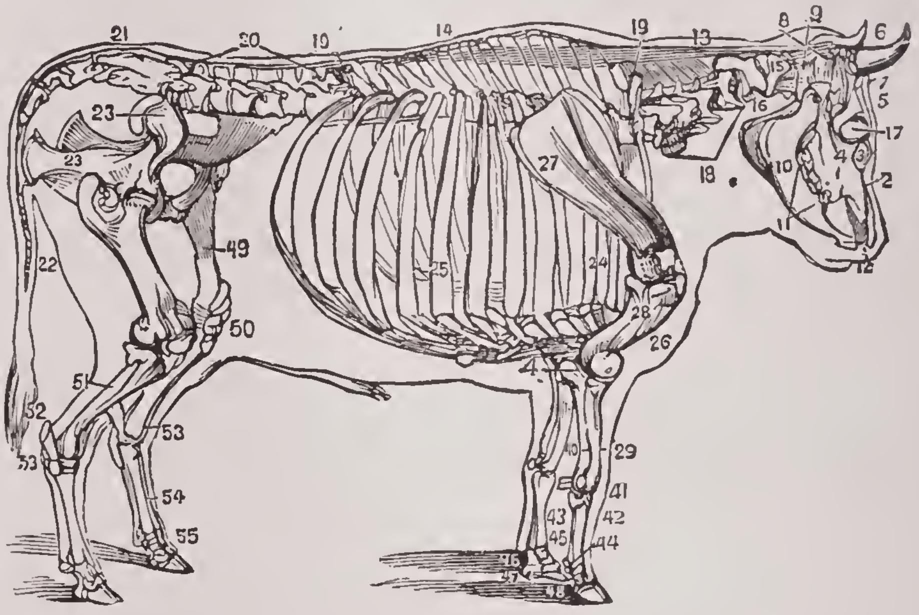


Fig. 15.—*Skeleton of the Ox.*

Anatomy. To enable the reader to become familiar with the bony structure of cattle we give an illustration, in Fig. 15, of the skeleton of the ox, with the correct names of the various parts. This will be found valuable for reference, not only to the student in the veterinary art, but to every one who proposes to keep and breed cattle.

Explanation of Fig. 15—1. The upper jaw-bone. 2. The nasal bone, or bone of the nose. 3. The lachrymal bone. 4. The molar, or cheek-bone. 5. The frontal bone, or bone of the forehead. 6. The horns, being processes or continuations of the frontal. 7. The temporal bone. 8. The parietal bone, low in the temporal fossa. 9. The occipital bone, deeply depressed below the crest or ridge of the head. 10. The lower jaw. 11. The grinders. 12. The nippers, found on the lower jaw alone. 13. The ligament of the neck, and its attachments. 15. The atlas. 16. The dentata. 17. The orbits of the eye. 18. The vertebræ, or bones, of the neck. 19. The bones of the back. 20. The bones of the loins. 21. The sacrum. 22. The bones of the tail. 23. The haunch and pelvis. 24. The eight true ribs. 25. The false ribs, with their cartilages. 26. The sternum. 27. The scapula, or shoulder-blade. 28. The humerus, or lower bone of the shoulder. 29. The radius, or principal bone of the arm. 40. The ulna, its upper part forming the elbow. 41. The small bones of the knee. 42. The large metacarpal or shank bone. 43. The smaller or splint bone. 44. The sesamoid bones. 45. The bifurcation at the pasterns, and the two larger pasterns, to each foot. 46. The two smaller pasterns to each foot. 47. The two coffin bones to each foot. 48. The navicular bones. 49. The thigh bone. 50. The patella, or bone of the knee. 51. The tibia, or proper leg bone. 52. The point of the hock. 53. The small bones of the hock. 54. The metatarsals, or larger bones of the hind leg. 55. The pasterns and feet.

"POINTS" OF CATTLE. In the cut shown by Fig. 16 we give the various "points" or parts of cattle.

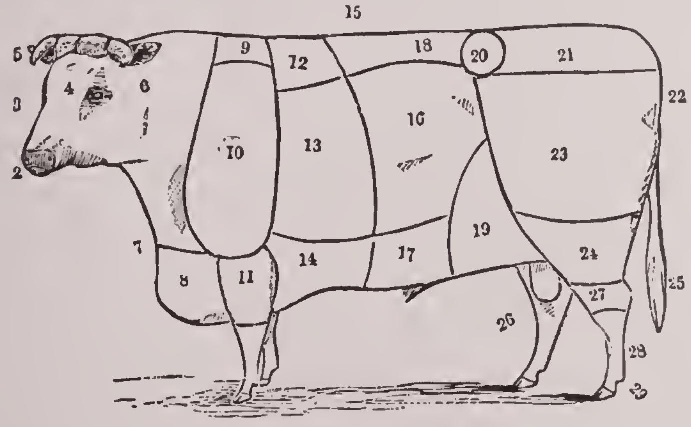


FIG. 16.—*Diagram of Points of Cattle.*

1, muzzle; 2, nostrils; 3, forehead and face; 4, eye; 5, horn and ear; 6, neck and throat; 7, breast; 8, brisket; 9, shoulder-point; 10, shoulder; 11, forearm; 12, crops; 13 fore-ribs; 14, fore-flank; 15, back; 16, back-ribs; 17, belly; 18, loins; 19, flank; 20, hip; 21, rump; 22, tail and seton; 23, quarters; 24, thigh; 25, twist (inside the thighs); 26 testes; 27, knee and gambrel; 28, leg; 29, hoof.

TEETH. Cattle have eight lower incisors and none upper. They have no canine teeth or tusks, but have 24 molars or grinding teeth; six on each side of the lower jaw, and six on each side of the upper jaw. The upper jaw has no incisors; but the skin upon which the lower incisors meet in the upper jaw are thickened, hard, and in aged animals almost horny. The teeth may be represented as follows, the figures above the line representing the upper, and the figures below the line representing the lower jaw:

$$\text{Incisors, } \frac{0}{8}\text{, canines, } \frac{0}{0}\text{, molars, } \frac{6}{6}\ \frac{6}{6}\text{; total, 32 teeth.}$$

AGE OF CATTLE. It is of the utmost importance to be able to judge of the age of a cow. Few farmers wish to purchase a cow for the dairy after she has passed her prime, which will ordinarily be at the age of nine or ten years, varying, of course, according to care, feeding, etc., in the earlier part of her life. The common method of forming an estimate of the age of cattle is by an examination of the horn. At two years old, as a general rule, the horns are perfectly smooth; after this a ring appears near the base, and annually afterward a new one is formed, so that, by adding two years to the first ring, the age is calculated. This is a very uncertain mode of judging. The rings are distinct only in the cow; and it is well known that if a heifer goes to bull when she is two years old, or a little before or after that time, a change takes place in the horn and the first ring appears; so that a real three-year-old would carry the mark of a four-year-old.

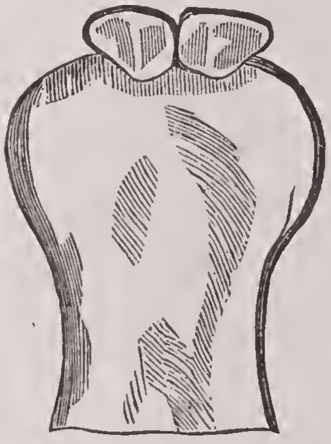


FIG. 17.—*Teeth at Birth.*

The rings on the horns of a bull are either not seen until five, or they can not be traced at all; while in the ox they do not appear till he is five years old, and then they are often very indistinct. In addition to this, it is by no means an uncommon practice to file the horns, so as to make them smooth, and to give the animal the appearance of being much younger than it really is. This is, therefore, an exceedingly fallacious guide, and cannot be relied upon by any one with the degree of confidence desired.

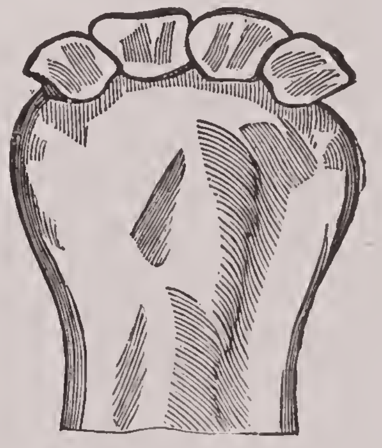


FIG. 18.—*Two Weeks Old.*

The surest indication of the age of cattle, as in the horse, is given by the teeth, but different markings are observed. While, in the horse the white, elongated figure in the center of the crown of the teeth, which grows rounder and of a darker color with age, in cattle the varying number, degree of wear, position, slant, etc., of the teeth are the points of observation; and while, therefore, it is comparatively easy to "bishop" a horse by disfiguring those simple figures in the crown of the teeth, and thus deceive purchasers as to his age, no clandestine art of the kind can be practiced upon cattle. It is therefore worth while to study the varying features of cattle's teeth.

The calf, at birth, has two front teeth—in some cases just appearing through the gums; in others, fully set, varying as the cow falls short of, or exceeds, her regular time of calving. If she overruns several days the teeth will have set and will have attained considerable size, as appears in the cut representing teeth at birth. During the second week, a tooth will usually be added on each side, and the mouth will generally appear as in Fig. 18. Before the end of the third week, the animal will generally have six incisor teeth, as denoted in the cut representing teeth at the third week; and in a week from that time the full number of incisors will have appeared, as seen in the next cut.

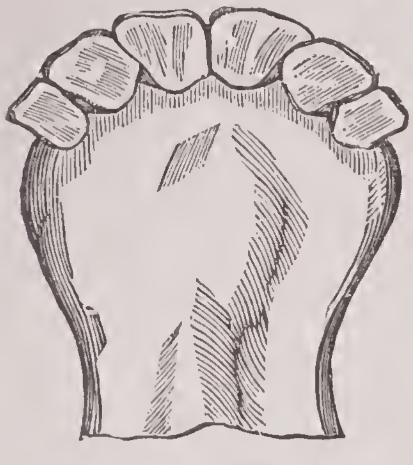


FIG. 19.—*Three Weeks Old.*

These teeth are temporary, and are often called milk-teeth. Their edge is very sharp; and as the animal begins to live upon more solid food, this edge becomes a little worn, showing the bony part of the tooth beneath, and indicates with considerable precision the length of time they have been used. The center, or oldest teeth show the marks of age first and often become somewhat worn before the corner teeth appear.

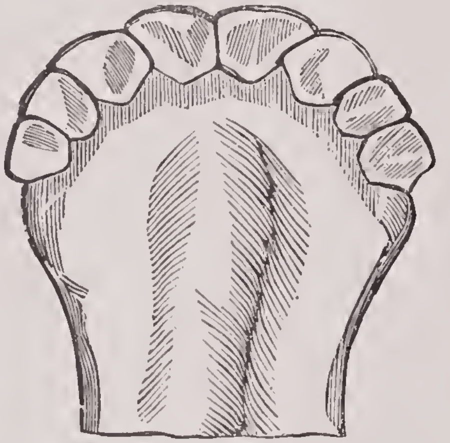


FIG. 20.—*One Month Old.*

At eight weeks, the four inner teeth are nearly as sharp as before. They appear worn not so much on the outer edge or line of the tooth as inside this line; but, after this, the edge begins gradually to lose its sharpness, and to present a more flattened surface; while the next outer teeth wear down like the four central ones; and at three months this wearing off is very apparent, till at four months all the incisor teeth appear worn, but the inner ones the most. Now the teeth begin slowly to diminish in size by a kind of contraction, as well as wearing down, and the distance apart becomes more and more apparent.

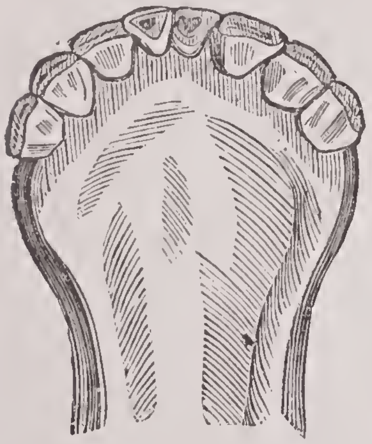


FIG. 21.—*Five to Eight Months.*

The temporary or milk incisors of horses differ in shape more from the permanent set than those of the ox. In the horse the milk teeth are altogether much smaller, but especially in the neck, which is constricted in them, whilst in the permanent set, which go on growing as they wear out, the diameter is nearly the same throughout. The former are also whiter in color and have grooves or indentations on their outer surfaces, running towards the gum. Lastly, the mark on the table is much slighter than in the permanent teeth. The temporary molars are not distinguishable from the permanent teeth of that class.

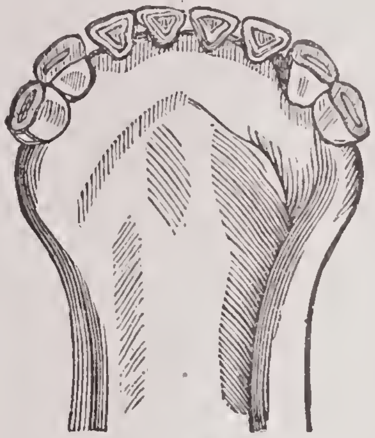


FIG. 22.—*Ten Months Old.*

As a consequence of this arrangement of parts, the teeth, as they wear down, present a different appearance according to the extent to which their attrition has reached.

From the fifth to the eighth month, the inner teeth will usually appear as in Fig. 21; and at ten months, this change shows more clearly, as represented in Fig. 22, and the spaces between them begin to show very plainly, until about a year old, when they will ordinarily present the appearance as shown in Fig 23, showing absorption in all nippers except outside pair, and wear in these; at the age of 15 months, that shown in Fig 24, where the corner teeth are not more than half the original size, and the center ones still smaller.

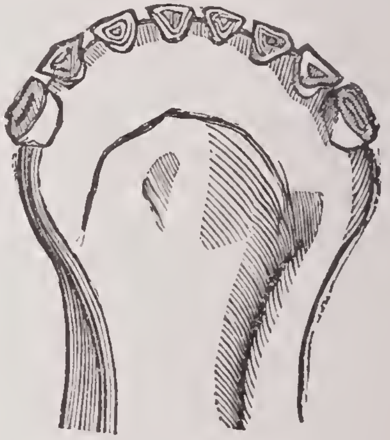


FIG. 23.—*Twelve Months Old.*

The permanent teeth are now rapidly growing, and preparing to take the place of the milk-teeth, which are gradually absorbed till they disappear, or are pushed out to give place to the two permanent central incisors, which at a year and a half will generally present the appearance indicated by Fig. 25, which shows the internal structure of the lower jaw, at this time the two first permanent incisors (1 — 1), and next two pairs (2—2) and (3 — 3) growing and pushing upward toward the surface, also (4 — 4,) 5 — 5 and 6 — 6) showing absorption. At 8 — 8 is shown the alveoli, or cells for the teeth. These changes require time; and at two years old the jaw will usually appear as in Fig. 26, where four of the permanent central incisors are seen, and four temporary ones, absorption nearly complete; also marks of wear on the first two pairs. After

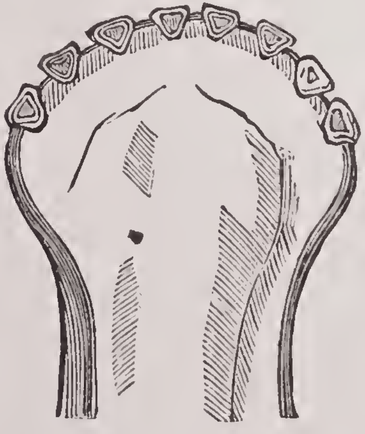


FIG. 24.—*Fifteen Months Old.*

this the other milk teeth decrease rapidly, but are slow to disappear; and at three years old, the third pair of permanent teeth are but formed, as represented in Fig. 27, showing six permanent nippers, and two outside temporary ones nearly gone; also wear on two central pairs. At four years the last pair of incisors will be up, as shown in the cut of that age (Fig. 28); but the outside ones are not yet fully grown, and the beast can hardly be said to be full-mouthed till the age of five years. But before this age, or at the age of four years, the two inner pairs of permanent teeth are beginning to wear at the edges, as shown in the cut; while at five years old the whole set becomes somewhat worn down at the top, and on the two center ones a darker line appears in the middle, along a line of harder bone, as appears in the appropriate cut (Fig. 29).

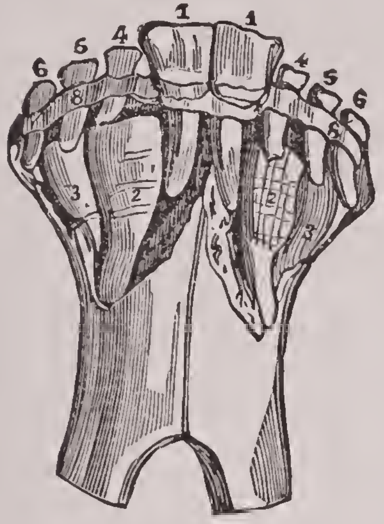


FIG. 25.—*Eighteen Months Old.*

Now will come a year or two, and sometimes three, when the teeth do not so clearly indicate the exact age, and the judgment must be guided by the extent to which the dark middle lines are worn. This will depend somewhat upon the exposure and feeding of the animal; but at seven years these lines extend over all the teeth. At eight years another change begins, which cannot be mistaken. A kind of absorption begins with the two central incisors—slow at first, but perceptible—and these two teeth become smaller than the rest, while the dark lines are worn into one in all but the corner teeth, till at ten years, four of the central incisors have become smaller in size, with a smaller and fainter mark, as indicated by Fig. 30. At 11, the six inner teeth are smaller than the corner ones; and at 12 all become smaller than they were, while the dark lines are nearly gone, except in the corner teeth, and the inner edge is worn to the gum. The age of the animal after this period is attained, is determined by the degree of shrinkage and wearing away of all the teeth in the order of their appearance, until the 15th year, when scarcely any teeth remain.

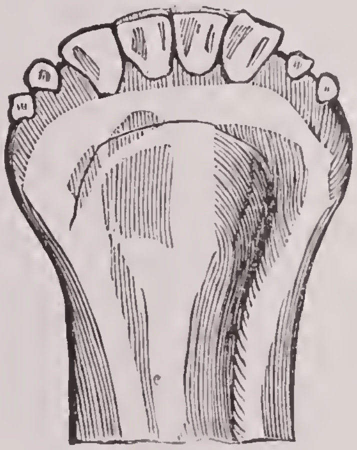


FIG. 26.—*Two Years Past.*

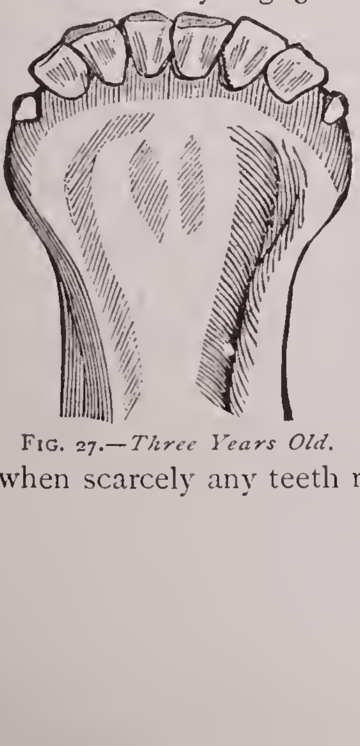


FIG. 27.—*Three Years Old.*

CUD. The situation, the structure, and the size of rumen, or the paunch, point it out as the first and general receptacle for the food, which received in the mouth only sufficient mastication to enable the animal to swallow it. When swallowed it is received by the rumen, and morsel after morsel is taken until this, the first of the animal's four stomachs, is comparatively full. A sense of repletion precedes rumination, during which act the animal generally prefers a recumbent posture. It is not to be supposed that all the food taken is again ruminated; it is only the bulky or solid portions that undergo the process. When the rumen is moderately full it will contract on its contents, and first squeeze out the fluid portions, which will pass into the third and fourth stomachs, while the solid part will be embraced by the œsophagus, or stomach pipe, and return to the mouth. By the term "loss of the cud" is meant a cessation of chewing the cud, which occurs as a symptom of most internal diseases of cattle.

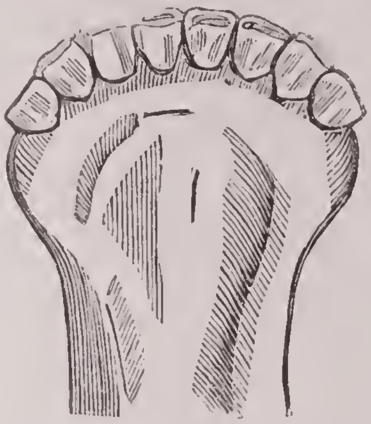


FIG. 28.—*Four Years Old.*

BREEDING. In the breeding of stock the farmer must understand the nature and adaptation of his soil, and its adaptability to certain crops and animals. In rocky, hilly, and comparatively barren regions, or where the soil suffers under drought, the farmer cannot compete either in the raising of beef cattle or in dairying, with the more favored, well matured countries of deep soils and flush pastures. Again, in a country noted for its short, sweet perennial pastures, and cold springs of water, the stock-breeder cannot compete with the dairyman. The feeder of cattle and hogs must be in a region where corn or other feeding grains can be cheaply and abundantly raised. Fortunately, such countries are well adapted to the meadow grasses, producing heavy crops of hay and pasture.

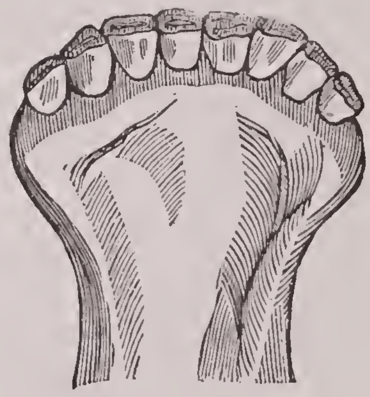


FIG. 29.—*Five Years Old.*

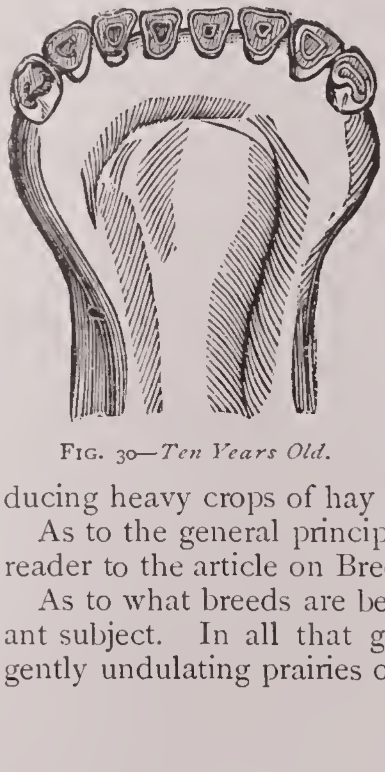


FIG. 30—*Ten Years Old.*

As to the general principles of breeding we refer the reader to the article on Breeding.

As to what breeds are best becomes a most important subject. In all that great region of the West, of gently undulating prairies or grassy plains, Short-horns and Herefords will be found the very best cattle to breed from, when only beef is the object. If labor and beef are wanted, the Devons and Herefords will be found the most valuable. If beef and milk are to be the products, the Duchess and Princess families of Short-horns, and Holsteins will give the best returns. If dairying is to be the chief industry, then, for butter, the Ayrshire, with a few Jerseys intermixed, will produce the best results. If for butter and cheese, Ayrshire and Short-horns. If cheese alone, the Holstein, and for quantity of milk given this latter breed will certainly carry the palm. If milk and butter, without reference to quantity, be required, the Jersey is the cow. All the breeds except the Jerseys will make good weights of beef and fatten readily when dry—the Short-horns, Holsteins, and Ayrshires making weight in the order named. For milk, we have not included the Devons; occasionally a cow will be found giving a large mess for her weight. Devons, however, are not dairy cows, at least, now-a-days, having been bred almost exclusively for their superior quality of marbled beef, and their uniform excellence, courage, and kindliness in the yoke.

It is evident that all farmers cannot become breeders of highly bred, pure stock. For this the animals must be isolated from all other breeds of the same race. At least the males must be strictly confined, so they may not intermix with others. Where farms join, divided only by fences, this will not be found practicable in a majority of cases. One's neighbors may fancy scrub stock. They are notoriously breachy. Once they intermingle with a pure breed the taint of their blood is not only found in the calves, but in the dams themselves. In the calves and their progeny, it may never be bred out.

As to the general utility of the stock the breeder cares not so much about a particular strain of blood, as he does to get certain characteristics that will furnish him, at the lowest expense, either the most beef, the best working oxen, or the most and best milk. Those who undertake breeding, or in fact any other business, in a hap-hazard way, always fail. The farmer, therefore, who undertakes the breeding of stock, with a view to the money they will bring from the butcher, or from sale of dairy products, must be guided by an entirely different set of rules from that of the breeder who breeds solely with a view to selling sires and dams to other breeders of pure stock. So particular, now-a-days, have breeders of this class become that some of them will breed only particular families. Some will not allow a Booth cross; others abstain from the Bates blood.

Many high-cast breeders are pretty well agreed that a top cross of what are known as Seventeens, and some other sub-families of later importations, and also of particular bulls of pure breeding, but which have been considered more or less coarse, must be rigidly excluded. They have their particular fancies. To gratify this fancy they will pay extraordinary prices, while the great mass of really superior and really pure Short-horns will be passed unnoticed. It would be unadvisable for the ordinary farmer, or even the Short-horn breeder, to buy these "terribly bred cattle." And the farmer must carefully discriminate. Let him get staunch, healthy cattle to start his herd, if beef be the object, and animals with good milk points, if milk be the object, rather than to strive for color. So long as the color of the animal is characteristic of the race, the beef points and milk points are what he should seek. The body in the beef animal, and the udder in the dairy cow, are what he wants.

Breeding in Line. Breeders of pure stock are especially particular in the selection of sires; so much so that many of them breed solely with reference to the strain of blood particular families contain, the selection often being without reference to the uniformity or quality of the animal selected. Really, however, breeding in line means the selection of males of a common type, and belonging to the same family. Thus, in breeding in the line, the expert, while he objects to going out of a sub-family, nevertheless seeks to couple animals together whose uniformity is identical, or, when one is weak in some essential, to improve it by coupling therewith an animal of superior excellence in this particular. Thus, if the head and horns be rather coarse in an animal, it is bred to one fine in head and horns, but not lacking in other essentials. It is one of the most fatal mistakes that can possibly be made in breeding, that to acquire one essential other disabilities be allowed to enter. Many breeders have committed irreparable injury to their stock by not understanding the necessity, while trying to improve one essential, of keeping all others intact. Therefore the sagacious breeder will pay more attention to those points indicative of heavy, succulent beef laid in the primer points and without an undue portion of fat, if combined with general symmetry, rather than style and carriage, connected with deficient characteristics in flesh. The one animal may be striking to the eye, while the other will bring the butcher's money. This is really all there is to beef cattle.

Breeding Grades. At the meeting of the American Association of Short-horns at Indianapolis, 1872, "pure-bred," "full blood," and "thorough-bred" were defined as being synonymous terms, and to indicate "animals of a distinct and well-defined breed, without any admixture of other blood." The following definitions were adopted by the Association:

"'Cross-bred'—Animals produced by breeding together distinct breeds."

"'Grades'—The product of a cross between a 'pure-bred' and a native."

"'High-grades'—An animal of mixed blood, in which the blood of the pure-bred predominates."

The product of a Devon and Short-horn would be a cross-bred animal. In-and-in breeding is considered to be the coupling of animals of the closest relationship, as the product of one sire and dam, etc. Close breeding is the breeding of animals together that are closely related; as animals one or two moves from the parent stock, in relationship. High breeding is sometimes incorrectly used in this connection; it is wrong.

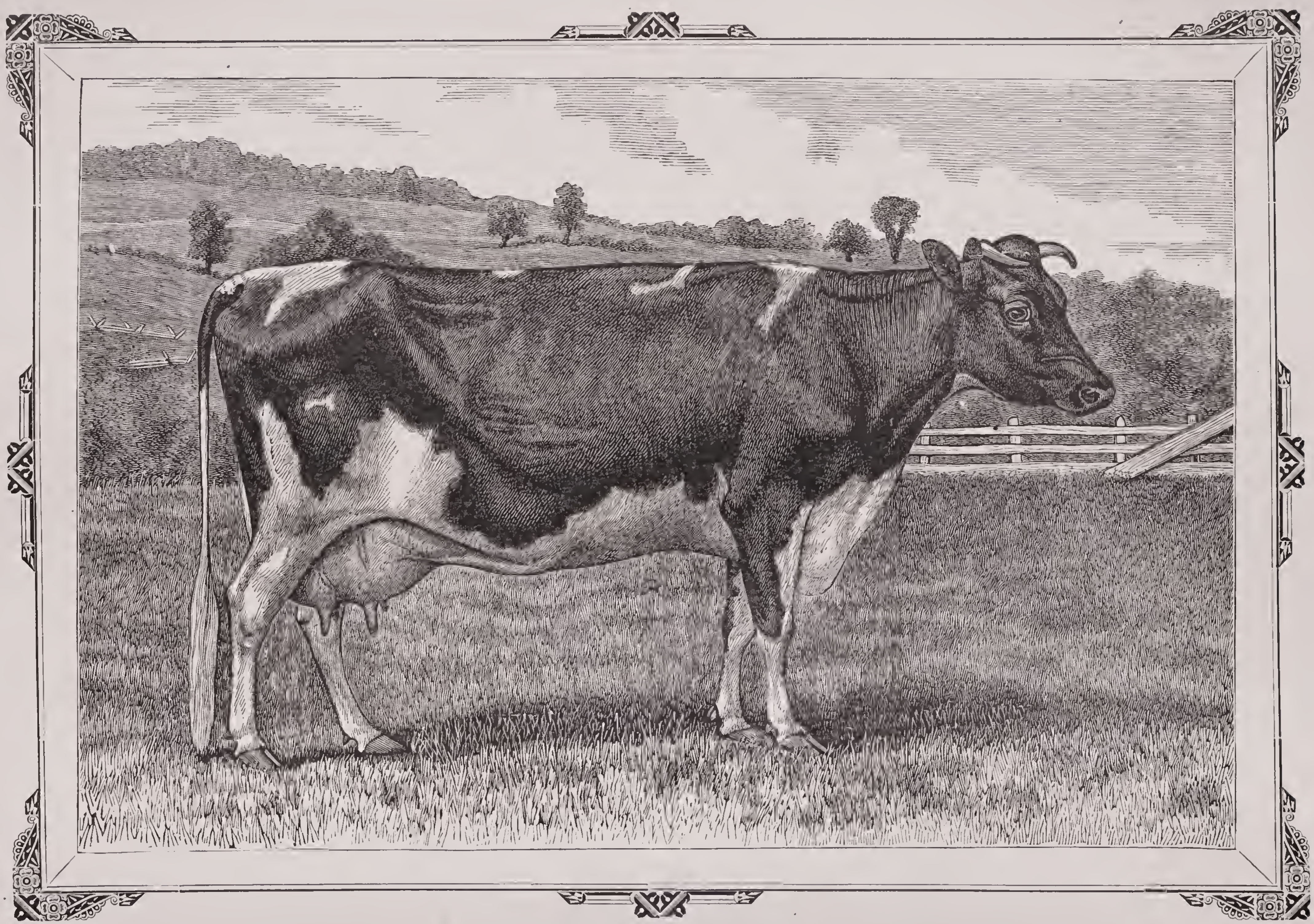


Fig. 3.—DUTCH-FRIESIAN COW.

Many of our most highly bred horses are not closely related, and the same may be said of our pure cattle. High breeding properly signfies the selection of the breeding stock, within the limits of some particular family, and within a definite standard of excellence and characteristics.

In the breeding of grades, select the best cows you can find, that is, those that come the nearest to the standard of excellence for the purpose wanted; then select a bull combining in the most eminent degree possible the points of real excellence for the outcome expected, not in fancy breeding, but in adaptability to the end sought. Thus, if for beef, he should be of fair size, not too large, certainly not too small, but of excellent fineness, combined with great loins, rumps and thighs, round-ribbed, and well ribbed, to the hip-bones, what a breeder would call a well bred, serviceable animal.

If for milk, the bull must have come of a line of uniform milkers, for here the udder and milk-veins are the essential part. In fact, the male must possess the peculiarities characteristic of the breed, and better if from a family of extraordinary excellence. Why? Such animals are prepotent; that is, they will impress upon their progeny the distinguishing characteristics and excellence of their race. By following the directions, in ten years one may have grades bred to such excellence that none but critical judges can tell them from pure-bred cattle.

FAT CATTLE AND FATTENING. Whatever may be said about over-fed cattle in a disparaging way, there is no doubt of the fact that the butcher cannot sell anything but the best fatted beef, and of whatever size or shape a half-fatted ox may be, he is never selected by judges as fit for human food. Hence, a well-fatted animal always commands a better price per pound than one imperfectly fed, and the parts selected as the primest beef are precisely the parts which contain the largest deposits of fat. The rump, the crop, and the sirloin, the very favorite cuts—which always command from 20 to 25 per cent. more than any other part of the ox—are just those parts on which the largest quantities of fat are found; so that, instead of the taste and fashion of the age being against the excessive fattening of animals, the fact is, practically, exactly the reverse. Where there is the most fat, there is the best lean; where there is the greatest amount of muscle without its share of fat, that part is accounted inferior, and is used for a different purpose; in fact, instead of fat being a disease, it is a condition of the flesh, and necessary to its utility as food—a source of luxury to the rich, and of comfort to the poor, furnishing a nourishing and healthy diet to their families. A tendency in an animal to deposit fat is indicated by roundness of form. Rules have been laid down by which one may know whether a creature has a disposition to fatten. The first is tested by the touch. It is the absolute criterion of quality. The skin is so intimately connected with the internal organs, in all animals, that it is questionable whether even our schools of medicine might not make more use of it in a diagnosis of disease. The skin must be neither thick nor hard, nor adhere firmly to the muscles. If it is so, the animal is a hard grazer, and a difficult, obstinate feeder. On the other hand, the skin must not be thin, like paper, nor flabby. This is the opposite extreme, and is indicative of delicateness, bad, flabby flesh, and possibly, of inaptitude to retain the fat. It must be elastic and velvety, presenting to the touch a gentle resistance, but so delicate as to give pleasure to the sensitive hand, a skin which seems at first to give an indentation from the pressure of the fingers, but which again rises to its place by a gentle elasticity. The hair is nearly as important as the skin. A hard skin will have straight and stiff hair; it will not have a curl, but be thinly and lankly distributed equally over the surface. A proper grazing animal will have a mossy coat, but absolutely curled, and presenting a heavy inequality. It will also, in a thriving animal, be licked here and there with its tongue—a proof that the skin is duly performing its functions. The eye must be full, bright and pressed out by the fat below; because, as this is a part where nature always provides fat, an animal capable of developing it to any considerable extent, will have its indications here, at least, where it exists in excess. Of course there must be size in the animal where large weight is expected. Small animals are, however, somewhat more easily fed, and are therefore better adapted to second-rate feeding pastures. But beyond this there must be breadth of carcass. Perhaps this is indicative of fattening beyond all other qualities. The head must be small and fine, which is a sign of the quick fattening of the animal, and also of smallness of bone and shortness of legs. The beast should have his legs extend well towards the thigh bones or hips, so as to leave as little unprotected space as possible. There must be no angular or abrupt points; all must be round, broad and parallel. In selecting stock for fattening purposes the foregoing hints may serve a good purpose. That kind of stock most in conformity to them will be most sure to return a profit for the feed given. Probably the Short-horns are most abundant in these fattening qualities, while a well-bred Devon, Hereford or Ayrshire can be made profitable as meat-producers. The treatment of fattening cattle is a matter about which any intelligent farmer should have judgment. Plenty of nutritious food is a chief requisite, and enough good water is another. Regularity in feeding is indispensable, and the quieter and more comfortable the fattening animal can be kept the better. Stall-fed cattle should have a small yard in which to exercise, as that will promote digestion; but their exercising ground should not be too large, for that would give an opportunity for too much movement, and working off of flesh. One reason why so many persons fail to be successful in fattening stock is that they do not use due consideration in their treatment. The man who kicks and clubs his stock, or allows his hired help to do so, never yet produced a prize steer, and never will. Obesity and activity do not go together, neither will undue excitability allow of a steady increase in fat. Hence the feeder, for the sake of his pocket, should see that fattening cattle are kept entirely quiet. For an excellent stall and appliances in which cattle may be kept we refer the reader to Figs. 4, 5, 6, 7 and 8 of the article on Barn. A safe and convenient manner of tying cattle in stalls is illustrated by Fig. 31. The chain is short, preventing the animal from getting entangled in it, and the ring around the upright is so large that it slides up and down readily.

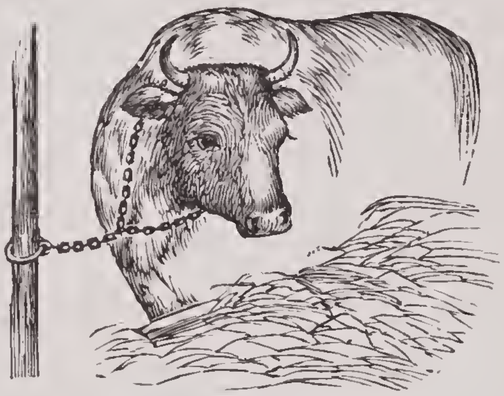


Fig. 31. *Best Mode of Hitching.*

Feeding and Care of Stock. Important as the kind and quality of breed is in the profitable production of live stock, yet feeding and care are equally important. The doctrine of the old farmers that "the breed is in the corn crib" is only half true, but that half is as necessary to the production of good stock as the other fraction of excellent pedigree. But whatever the breed, cattle should be judiciously cared for. The too prevalent custom of permitting cattle to care for themselves should be changed to a more profitable system. The common practice is to turn them upon pastures in the spring, after having been inadequately fed through the winter, and on the feed which that pasture affords they have to subsist, whether it be luxurious from frequent and copious rains, or parched and scant from long continued drought. Throughout the fall, stock is obliged to run the hazard of being overfed in the parched pastures, a shortage which is made worse by the early and later frosts. In winter too many farmers, at the East, oblige their stock to subsist on poor hay or straw, and in the West the practice is to turn cattle into the corn-field, after the corn is picked, where they must live, and if possible thrive, on dried corn-stalks. Notable improvement has lately been made on this slip-shod and inconsiderate method, but there is yet vast room for improvement. The secret of heavy weights in fat cattle, and growth and health of stock generally, is in constant feeding and uniform good treatment. Cattle are often in splendid condition in June on the pasture, but during the succeeding dry and hot months, when the pastures become short, they decline rapidly in flesh. They fatten up again in milder autumn, but if the farmer is late in gathering his corn, they become scrawny and ill-conditioned before they are turned again into the corn-fields or meadows. Here they cram themselves for the first few weeks, perhaps become almost fat enough for the butcher, and then begin a steady decline in flesh and condition, so that when grass comes again, they are scarcely able to walk to the pasture. The use of a corn-field, for a foraging ground, as practiced in the West, is of doubtful utility. Practical experience has demonstrated that there is money in high feeding at an early age. Calves, according to breed, may, as an average, be grown to the weight of 800 or 1,000 pounds at one year, and 1,200 to 1,500 the second year. The animal will also be as fully matured at two years old as at four under the meager system. It will require more than double the food to supply the waste of the system the second year that it did the first, and fifty per cent. the third. This explains the reason of the increased cost of putting live weight on animals as they grow older. It follows, then, that beef creatures should be sold at the earliest period of maturity required by the market. Profit, then, can only be expected from full feeding under the system of early maturity. An animal to be fully fed and satisfied requires a quantity of food in proportion to its live weight. No food is complete that does not contain a sufficient amount of nutritive elements; hay, for example, being more nutritive than straw, and grain than roots. The food, too, must possess a bulk sufficient to fill up to a certain degree the organs of digestion of the stomach; and to receive the full benefit of its food, the animal must be fully satisfied, since, if the stomach is not sufficiently distended, the food cannot be properly digested, and many of the nutritive elements which it contains cannot be properly assimilated. About one-sixtieth of their live weight in hay, or its equivalent, will keep horned cattle on their feet; but in order to be completely nourished, they require about one thirtieth in dry substance, four thirtieths in water, or other liquid. The excess of food above what is necessary to sustain life, will go, in milch cows, to the production of milk, or to the growth of the fœtus; but not in all cows to an equal extent; and in young cattle to growth, in beef cattle to the laying on of weight. In the breeding and rearing of stock great care should be taken to render cattle comfortable in summer and winter. A good farmer will always afford his stock abundance of nutritious feed and plenty of pure water. One of the best means of supplying water is an automatic stock-watering device, invented by J. G. Brown, Van Cleve, Iowa, and illustrated by Fig. 32. It is used for utilizing water from tile drain for all kinds of stock. It supplies clear, cool, running water without mud in summer or ice in winter. It can be attached to a drain at any desired point. It is made of wood, at a trifling cost, and any farmer can make it. The cut illustrates the principle upon which it works. When this is done, the means for the comfort of the animals should be at hand—shade in the summer, warm housing and yard shelter in the winter.

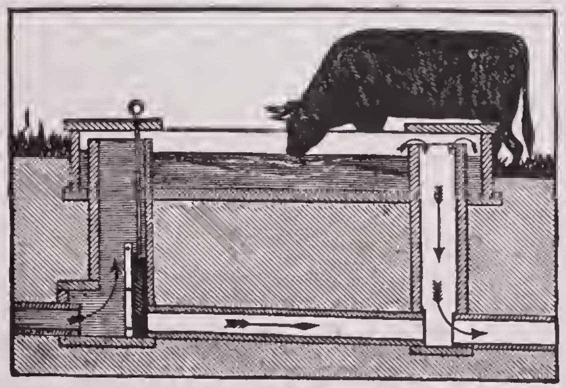


Fig. 32.—*An Automatic Stock-Watering Device.*

It is useless to furnish abundance of feed unless cattle are kept warm and comfortable; for in winter, when cattle are exposed, much of their food goes to supply animal heat. To sum up a general statement about the care of stock, we have this:

1. Select the best breeds for the branch of stock-growing you wish to follow.
2. Provide ample, nutritious and constant food, the year round, for your cattle—of hay, or other long food, grain and roots, combined, if possible.
3. Feed abundantly and judiciously, when the animals are young, thus bringing to maturity as early as may be, and by this means secure the largest amount of profit in their growth.
4. House warmly in winter, and provide ample shade in summer, so that comfort shall be secured, and the growth, fineness of bone and flesh, docility of temper and economy of feeding enhanced. (For further treatment of the care and feeding of particular kinds of stock, see Bulls, Cows, Calves, etc.)

To prevent the wastage of hay or straw fed in lots a rack should be provided. Fig. 33 represents an old-fashioned but very handy feed rack. It is cheap and easily constructed. It may be made of poles, rails or stakes, of any kind and any length, which may be held in piace by laying a pole in the rack, or each stake may be spiked to the horizontal pole.

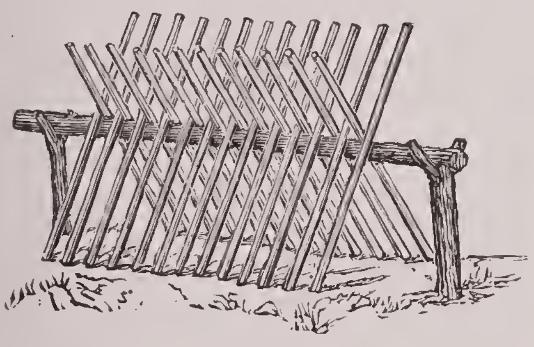


Fig. 33.—*Feed Rack.*

How to Buy and How to Sell. There are very many farmers who, by care and attention to details in feeding their stock, and by kindly treatment, have done so with profit to themselves. They have raised them from calfhood. Let them undertake to buy cattle for feeding their surplus grain and fodder, and they are very apt to overrate the weight and true value of the cattle purchased. One point should always be kept steadily in mind: never buy an old steer or cow for fattening. They never repay the cost and trouble they give. Thin cattle, ready for grass, if healthy, may give good returns on flush summer pasture, if bought at the price per pound that you expect to get in the fall. You will not only get the price of the flesh put on, but the cattle being thin and the muscles dry, your profits will be added to in the fluids absorbed, and the loss will lie with the former owner in making mere frames to build upon. So animals bought in the fall in common grass flesh, will increase wonderfully with good feeding and shelter. If you buy at $2.50 per 100 lbs., and so add 200 lbs. in flesh, and sell at $4 per 100 lbs., you not only get $8 for the flesh put on, but the difference between $2.50 and $4, or $1.50 per 100 lbs. on the original weight. That is, you buy steers at 1,000 lbs. each, feed 500 bushels of corn per head. and sell them weighing 1,200 lbs. average. They cost $25 and sell for $48, leaving $23 as the value of the corn fed and care given. The manure in any country will pay for the care taken; so, your corn will have netted you near 46 cents per bushel. From this, knowing the cost and price expected when fat, it will be easy to figure on profits, fluctuations and accidents excepted.

Estimating Weight. An expert judge will estimate from seeing and handling steers often within ten pounds of their live weight. The buyer will always underestimate weight, and in nine cases out of ten convince the inexpert owner that the guess is right; in fact, more than half the time the seller will be convinced that he has the best of the bargain. The only safe way in such cases is for the seller to weigh. Every man who makes a business of fattening cattle should own a proper scale. He may save the cost in a single year. The merchant, the manufacturer and the builder, who work by guess, always end in bankruptcy. The only reason why farmers do not, is, they have that generous bank, mother earth, which never fails to respond, even to indifferent managers.

In weighing cattle note carefully why certain ones weigh out of proportion to others, and study whether the weight is in the prime parts, a broad loin and hips, and good barrel, or in heavy fore-quarters, with thick neck and big head and horns. Study carefully the points as given in detail elsewhere in this article, and as carefully remember them for future use. Thus you may in time become yourself an expert judge of stock. If an animal is to be killed, estimate his weight alive, how much he will shrink in offal and hide. When the quarters are weighed, if the record is not as you expect, examine carefully wherein the discrepancy lies. It is an especially interesting study for the young man who expects himself to become a breeder and feeder of cattle. If a breeder, he must know how to sell; and if a feeder, he must know both how to buy and sell.

Estimating by Measurement. Many breeders have rules of estimating the weight by measurements. There is no rule that comes nearer than good guessing, and all guessing should be avoided, especially when the guessing is to lie on the part of the buyer; that is, the seller should avoid trusting to the guess of the buyer based upon measurement. No two animals will weigh alike according to measurement.

One rule, perhaps as good as any and for this reason given, is to find the superficial feet by multiplying the girth, just behind the shoulder-blade, by the length from the fore part of the shoulder-blade to the root of the tail. Thus an ox girthing seven feet nine inches and measuring six feet in length would contain seven and three-fourths times six, or 46½ superficial feet. For cattle grass fat, the following is given as the weight per superficial foot:

Girth less than 3 feet	11	pounds
" 3 to 5 feet	16	"
" 5 to 7 feet	23	"
" 7 to 9 feet	31	"

Thus the steer as per above measurements should weigh 46.50 by 31, or 1,441 lbs. gross. Under this rule it is usual to deduct one pound in 20 on half-fatted cattle, from 15 to 20 lbs. on a cow having had calves, and if not fat an equal amount. The rule as above stated is of little or no value, except to those having no other means. In taking account of stock, this may may come somewhat near the weight. For buying or selling, the scale is the only true standard.

BUYING TO FEED. In buying cattle either to graze or to feed fat, choose cattle that are young, that is, that will not have become mature before ready for sale. If to be kept a year, three years old past to four years old for natives and Devons, and one year less for Shorthorns or Hereford grades. Buy no overgrown, leggy animals; they are hard feeders. Neither should they be under-sized, as this indicates want of thrift. The cattle for money, whatever their breed, are compact, smooth, fine-boned, meek-eyed, soft-haired steers, with skin of medium thickness; thick through the heart, round-barreled, well ribbed, with broad rump, and the twist well down to the hock. Such cattle, whatever their breed, will fatten easily and the meat will be of excellent quality. So far as age is concerned, the teeth must be the test. In this no person can err who has carefully studied the section on Teeth, pages 181-83.

HOW TO BUY BREEDERS. If the intention is to raise beef cattle, the same rule will apply as in buying steers. In no case should the cow be more than three years old, and it is better that she never had a calf. In breeding for beef, milk is not the first essential. It is necessary, however, that the dam give a fair amount of milk, since the proper sustenance of the calf is what lays the foundation of the future value of the steer. No calf starved when young can make a valuable cow to breed from, and as is the dam so naturally will be the produce. Whatever is to be the outcome, avoid at any price a vicious cow, or one with a wild eye, or having a dished shape. Her progeny will be sure to give you trouble and will not give you cattle that will fatten to a high standard.

BUYING FEEDING STOCK. The novice in buying stock should carefully note the shape and make-up. To the superficial eye the superior animals when thin will appear worse than the inferior ones; the bony parts will appear more prominent, and for this reason their breadth, when thin, will seem to be exaggerated; this, however, is only apparently so. An animal of no particular character may seem fairly smooth to the eye. Those accustomed to handling stock will know that superficial observation goes for little. The touch is what decides the value of an animal. The well-bred animal carries softer, smoother, and finer hair than the ill-bred one; its breadth from the shoulder to the rump gives it a bony appearance when thin, that in the scrub steer is partly concealed by the higher backbone and coarser hair. We are now speaking of no particular breed, but of all breeds and crosses that have characteristic points enabling them to lay on flesh.

PROPER SHAPE OF WELL-BRED FATTENING STOCK. Cut off the head, neck, legs, and tail, and well-bred beef cattle will present the appearance of an oblong square. Thus there is ample room for the legs and viscera through the width of the bosom and spring of the ribs, and this carries corresponding breadth behind, giving a broad loin and massive rump. Such an animal will feed heartily and kindly, satisfy the butcher when brought to the block, and be profitable to the feeder. There is no profit, however, to the feeder in cattle fattened to obese or immense weights; they are mere mountains of fat, and contain no more lean meat than animals fattened fairly ripe. There are few people who do not like well-fattened beef. Few, however, care to eat any but the lean. An animal, therefore, that is fattened just ripe is the heaviest in muscle, well marbled with fat. This is what the consumer wants and what feeders should seek to make. Smooth, fine-horned, medium cattle, according to the breed selected, are what give profits in this respect.

HOW TO BUY. In buying ordinary (that is native) cattle for pasturing and feeding fat during the summer and fall, always buy in the spring. If the grass is good at the time of purchase, as it should be, no matter how thin the stock, if healthy and hearty. The thin stock will weigh less, and you will have to pay less for it. The loss will be with the farmer who grudges his animals sufficient to eat in winter, rather than with the buyer. Generally all this class will sell cheaper in the spring than in the fall, and as a rule yearlings may be bought for less money in the spring than the same calves would have brought in the fall. If they have been fairly wintered they will be profitable to feed; if badly wintered, it will be questionable, unless the price paid is low enough to warrant the purchase. In any event the feeder must usually depend upon buying steers off of common keep. Good feeders are not apt to sell half-grown steers, nor those that one more season's keep will make ripe. The best money-making friends of the sagacious buyer are, after all, those who never read, and will not believe that anything in print relating to agriculture in any of its various departments can be of value. They do not know that as great advances have been made in agricultural art within the last thirty years as any other industry, and that the best practical talent in Europe, and within the last few years in America, have been earnestly engaged in elucidating and applying practical science to agriculture.

ADMINISTERING TREATMENT. That the farmer may form some intelligent basis of distinguishing disease and administering treatment to his cattle when afflicted, we give the following concise and accepted theories and modes of practice among the best veterinarians.

GRADUATION OF DOSES. As a rule cattle require one and a half times as much as horses; sheep and pigs require one-third as much. Professor James Law, of Cornell University, in his work, *Veterinary Adviser*, has presented the manner of graduation, frequency, and form of administering doses, in the following concise language:

The doses given may be held applicable to full-

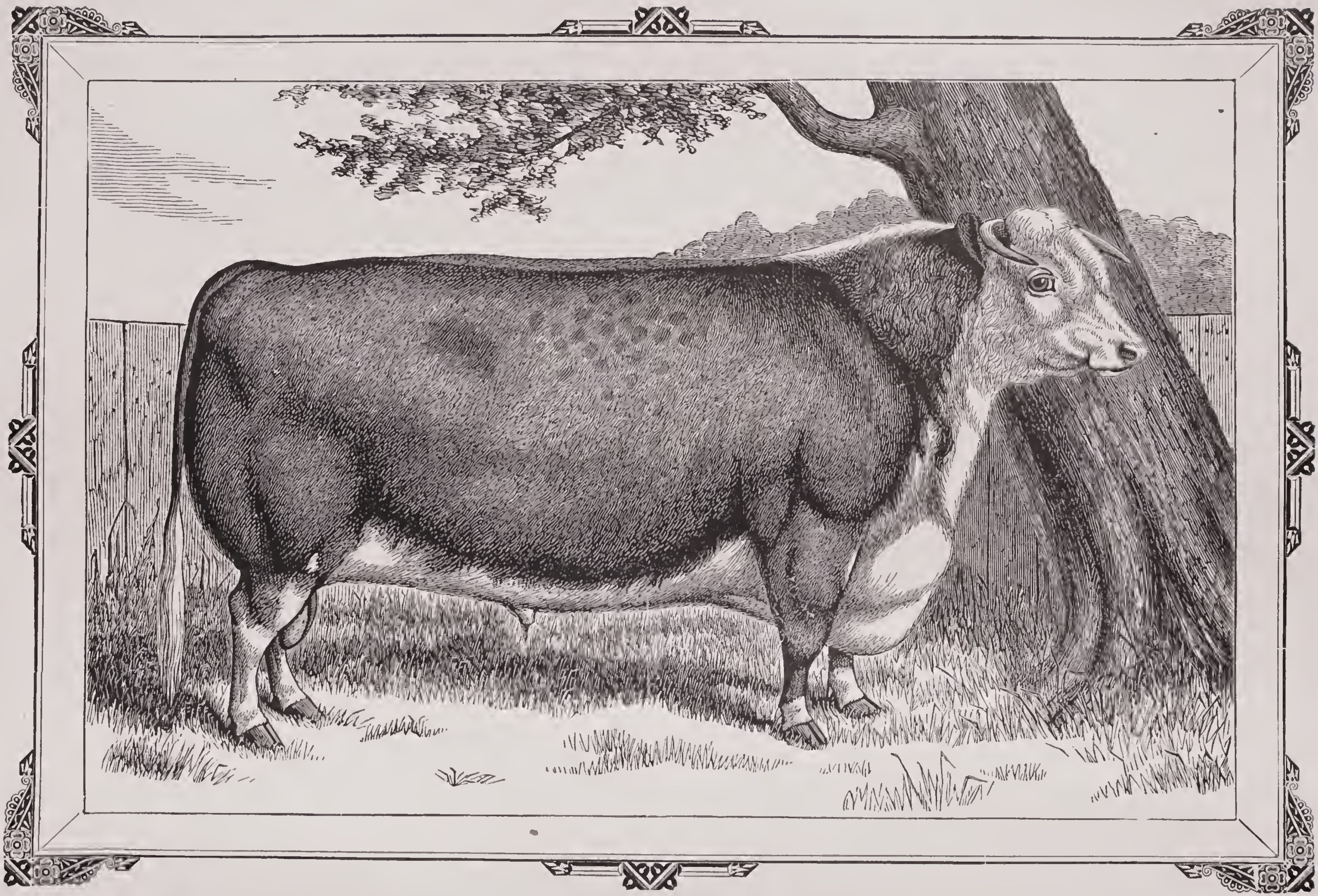


Fig. 4.—HEREFORD BULL.

grown animals of medium size, therefore some allowance must be made in any cases in which the patient exceeds or comes short of the average of his kind. A similar modification must be made as regards young animals, not only on account of their smaller size but also of their greater susceptibility.

The following table will serve as a guide:

DOSES OF MEDICINE FOR DIFFERENT ANIMALS.

Horses.	Cattle.	Sheep.	Swine.	
3 years.	2 years.	½ years.	15 months.	1 part.
1¼ to 3 yr's.	1 to 2 years.	9 to 18 months.	8 to 15 months	½ "
9 to 18 mo.	6 to 12 mo.	5 to 9 "	6 to 8 "	¼ "
5 to 9 "	3 to 6 "	3 to 5 "	3 to 6 "	⅛ "
1 to 5 "	1 to 3 "	1 to 3 "	1 to 3 "	1-16 "

Allowance must also be made for a nervous temperament, which usually renders an animal more impressible; for habit, or continued use, which tends to decrease the susceptibility for individual drugs; for idiosyncrasy, which can only be discovered by observing the action of the agent on the particular subject, and for the influence of disease when that is likely to affect the action. Thus, in most diseases of the brain and spinal cord, and in some impactions of the stomach, double the usual quantities of purgative medicine will be necessary; while in influenza, and other low fevers, half the usual doses may prove fatal. In acute congestion of the brain, stimulating narcotics (opium, belladonna, hyoscyamus) would aggravate the symptoms, etc.

FREQUENCY OF ADMINISTERING. Anodynes, antispasmodics, narcotics, sedatives and stimulants may generally be repeated once in four or six hours in order to maintain their effect. Alteratives, diaphoretics, febrifuges, refrigerants and tonics, may be administered twice daily. Purgatives should only be given when necessary, and should never be repeated until from the lapse of time we are assured that the first dose remains inoperative.

FORM OF DOSES. Drugs may often be given as powder or solution in the food or water; they may be made into a soft solid with syrup and linseed meal, rolled into a short cylinder and covered with soft paper; they may be converted into an infusion with warm or cold water, or into a decoction by boiling; or they may be powdered and suspended in thick gruel or mucilage. They may be given in a liquid form, from a horn or bottle; or as a short cylinder or pill, which may be lodged over the middle of the root of the tongue; or, as a sticky mass, they may be smeared on the back of the tongue; may be given as an injection into the rectum; or, finally, in the case of certain powerful and non-irritating agents, they may be injected under the skin.

No agent should be given until sufficiently diluted to prevent irritation, if retained a few minutes in the mouth, and irritants that will not mix with water (oil of turpentine, Croton oil, etc.) should be given in a bland oil, in milk, or in eggs after being thoroughly mixed.

HOW TO GIVE MEDICINE. Few things are so awkwardly done, as a rule, as giving medicine to farm animals. In the hands of a careful and expert person, a strong glass bottle is good. A better instrument is a flattened bottle of block tin, which for cattle should hold two quarts. The most usual instrument, and on the whole the best for ordinary operations, is the horn. Select one of which the point turns down and the large end up; form this of the proper size and fashion so the opening will be oblique.

Drenches should always be thoroughly mixed, and well shaken before they are given. If a fit of coughing ensues, free the animal at once and until it be ended. In operating with cattle do not irritate the animal unduly. Always operate from the right or off side. Pass the left hand over the head, and in front of the horn, seize the upper jaw firmly in front of the grinders, turn the head firmly back, the operator standing well braced, the back firm against and as well forward of the shoulders as possible. Thus, having the animal with one side against a wall or the side of the stall, it must be a very vicious cow or bull that a strong, expert man cannot handle. If, however, the operator does not stand well forward and well braced, he may be severely kicked, since an ox, like a deer, can reach well forward with its hind feet. The usual quantity for an ox is from one to two quarts at a dose, if liquid, of ordinary decoctions and solutions.

INJECTIONS, OR CLYSTERS. A large number of medicines, both liquid and solid, may be as easily administered per rectum as by the mouth. In administering injections, it is not necessary that much pressure be used. The intestinal canal of the animals is lower than the opening. Thus fluid substances will fall by their gravity. A good instrument for use may be a pail, with a tube extending from the bottom connecting with a half-inch rubber hose, of suitable length, so that the pail may hang just high enough above the animal to be out of its reach in moving about. Oil the end to be inserted into the rectum, and the fluid may be passed into the gut, as much or as little as may be desired, and with much better effect than when strong pressure is brought to bear on the fluid.

VAPORS, SPRAYING AND FUMIGATION. These are medicaments drawn in with the breath. Chloroform and ether may be administered by means of a sponge filled with the agent and held to the nose. Vapors are easily produced from liquid substances by means of an atomizer, sold by all druggists.

Steaming is often of great benefit. Hot water, either plain or medicated, may be held under the animal's nose, and the steam strongly driven off by plunging a hot iron into it at intervals. A hot bran mash, in a nose bag, readily gives off steam.

When an anæsthetic is used, it should not be held to the nose continuously, since, if undiluted with air, it is fatal. Watch carefully and suspend the use of the anæsthetic as soon as unconsciousness is produced, to be renewed from time to time as may be necessary. They should not be used unless under the advice of a surgeon or physician, since the need can hardly be expected except for the performance of some intricate surgical operation. The following is endorsed by high veterinary authority: 1 ounce alcohol, 2 ounces chloroform, 3 ounces ether. Shake the bottle well before using it; pour a teaspoonful or more at a time on a sponge; hold it to the nostril. Two or three moments should be enough to overpower the strongest ox.

Blistering. Blistering is a valuable remedy, when it is required to ease the absorption of deposit, to stimulate the vessels to effect organic change, as hastening the ripening of an abscess, or the reduction of an enlarged gland; they should be entirely confined to cases where the acute inflammatory symptoms have ceased. Blisters do no good in deep-seated inflammations. Yet the quack, if he *suspect* internal inflammation, claps on a blister, which only agonizes the dumb brute, and generally leaves a permanent blemish. When a blister is found necessary, before applying, always as an ointment or fluid, and never as a plaster, cut or shave the hair from the part, wash and dry thoroughly, and apply with strong friction for several minutes. The following, if thoroughly applied, will raise a blister, and will not leave a blemish:

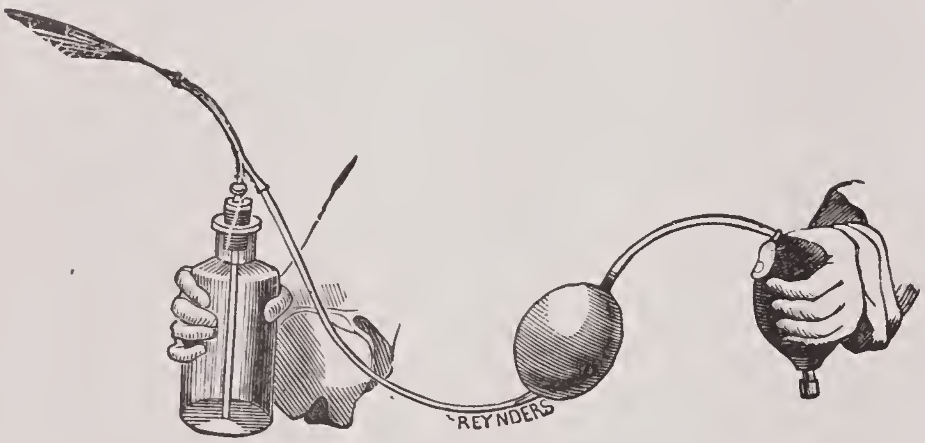


Fig. 33.—*Atomizer.*

1 ounce powdered cantharides, 12 ounces lard, heated to 212° Fahr. Mix well together and stir until cool.

A sweating blister of medium strength to be used to produce irritation and a watery discharge without raising a full blister, and which may be applied separately to the same spot and without removing the hair, is made as follows:

1 ounce powdered cantharides, 1 pint alcohol.

Add neither corrosive sublimate, arsenic, acids, nor turpentine to blistering agents. They are not useful, are often injurious, and always give unnecessary pain.

As a rule, sufficient irritation can be produced on cattle by mustard and hot water, well rubbed in, and this form should be used except in particular cases. The following rules should be carefully remembered:

1. Never blister more than one or two spots at the same time.
2. Be careful about blistering in hot weather.
3. Never blister an inflamed part when there are symptoms of mortification.
4. There is always danger of producing strangury in horses from blistering.
5. When a blister causes great nervous irritability, loss of appetite, or difficult urination, wash the blistered surface with strong soapsuds of soft soap, dress it with sweet oil, and give a full dose of opium.
6. The second day after a blister has been applied, foment the part with warm water, and dress it with lard or oil.
7. An animal that has been blistered should be prevented from biting, rubbing, or otherwise irritating the blistered part.

Firing. The actual cautery is most valuable in bone diseases, or chronic lameness. In certain diseases it cannot be successfully replaced by any other counter-irritant. The iron should be at a full red or white heat, and used with a light hand, so that a distinct impression is made. More than one leg should not be operated on at one time. It should never be performed by inexpert hands. The hair must be closely shaved, and the animal securely fastened. A better way for the novice is to cut a piece of bacon rind with some of the fat attached. The iron, which should be flat or slightly hollowed, is to be heated to a dull read heat. Place the bacon rind on the sprain or tumor, and apply the iron firmly for two or three minutes, and afterwards more lightly, until the rind is dried or burned. This may be repeated at intervals of two or three days. The influence will be potent, and will leave no scar. It should never be used on cattle, except in the case of a tumor, where the animal is valuable.

Setons. Setons are used in cases of bone disease, in the healing of old fistulas, by producing a new and healthy inflammation in its sides. They should be inserted the whole length of the canal.

Setons are composed of tapes, threads, or fine wires, pushed just underneath the skin by means of a seton needle, entering at one point and coming out at another. Fasten the ends, to prevent dropping out, smear with irritant salve and turn every day or two to keep up a constant irritation and discharge. The following will be found good ointments for smearing the setons: 1 part powdered cantharides, 8 parts oil of turpentine, 8 parts Canada balsam. Put the two first in a bottle and keep warm for two days and add the balsam. A simple ointment would be: 3 parts citrine ointment, 1 part oil of turpentine. Mix.

Rowels. These are wounds made with rowel scissors or a bistoury, and kept open with a pledget of tow or other substance, smeared with ointment, as used for setons. They are rarely used now by good surgeons, and are not to be recommended, since their action is that of the seton.

Sewing up Wounds. The bleeding of wounds having been checked and properly cleaned, the edges are brought together and held in position by means of stitches or sutures. The interrupted suture is made by carrying a suture needle, armed with white silk or white linen thread, through the two edges of the wound and cutting off, leaving about three-inch ends on each side of the cut; bring together and tie. So

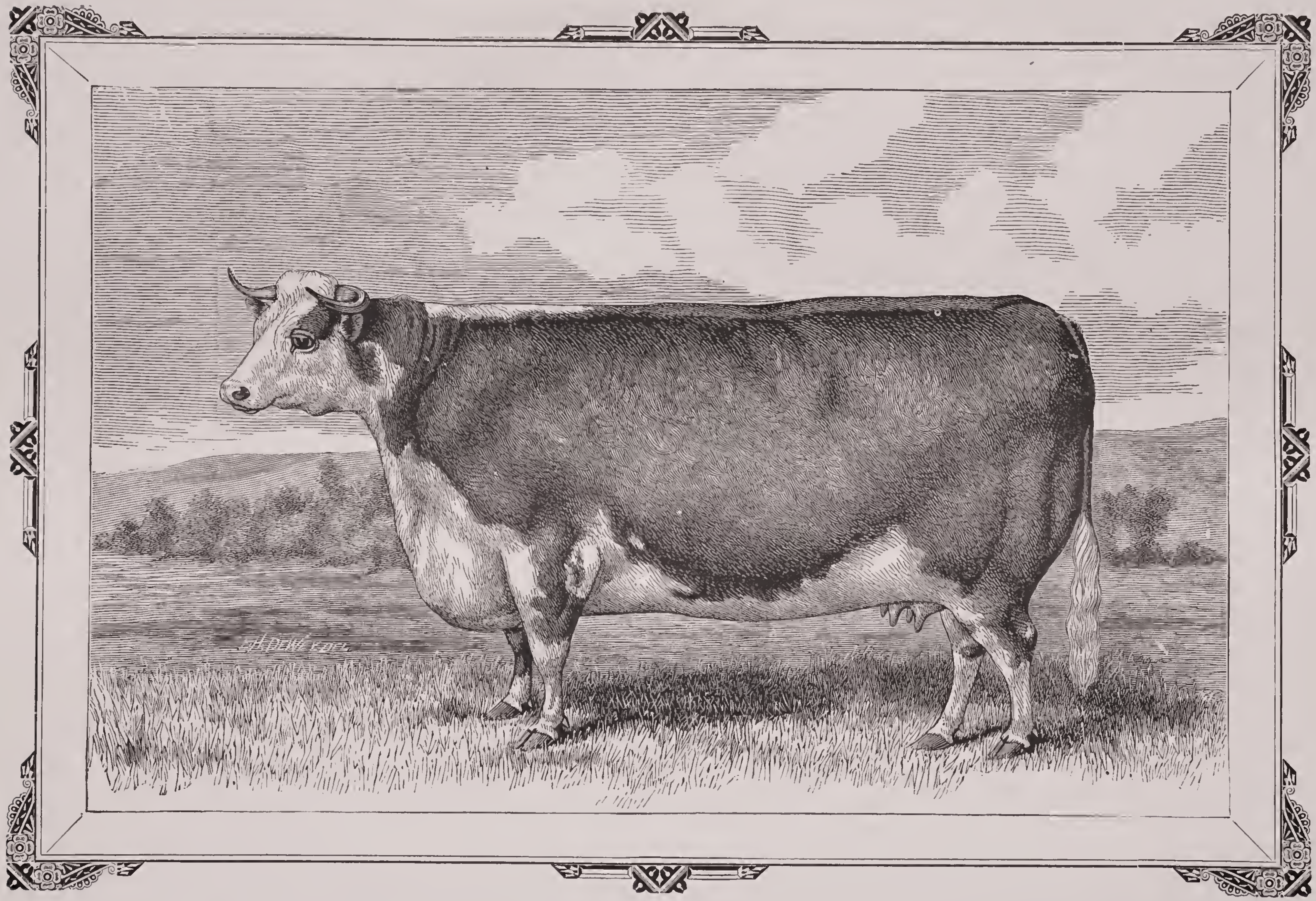


Fig. 5.—HEREFORD COW.

proceed until you have the wound nicely closed, the lips of the wound or skin being carefully brought together.

The twisted suture is better in inexpert hands when it can be used. Bring the edges of the wound together, press a strong pin through to hold in place, and twist a fine wire or lace a strong thread across the protruding ends of the pin to hold the edges of the wound firmly together. So proceed at intervals of three-eighths of an inch until the wound is closed.

The wound thus sewed, dress with a plaster or ointment and bandage to prevent threads or pins from being torn out. Remove them as soon as the surfaces have united, which should be in four or five days.

FOMENTATIONS. These are applied by wrapping the part to be treated with flannel bandages or woolen cloths, keeping the wrappings constantly wet with hot or cold water, or mixed with any appropriate addition, as vinegar, laudanum, etc. They are used to cleanse or soothe irritable wounds, to reduce internal inflammation, or relieve external inflammation. Unless persistently used for hours and kept constantly wet, they had better not be attempted. After the operation is finished, rub dry and clothe warmly, to prevent chill, which will surely occur. As an additional precaution, a little mustard rubbed in would be beneficial. When it can be applied, a sheepskin with the wool on, wrung out of hot water, makes a good agent for fomentation.

THE OPERATION OF BLEEDING. There is no operation in veterinary practice that has been more abused by quacks and other persons ignorant of the true necessity, than bleeding. It should never be performed except by those who have been instructed in the operation, and only in those cases where by common consent of the profession it is allowed. If a decided impression is to be made, as in apoplexy, from five to seven quarts should be taken from an ox, according to the conditions. If the jugular vein is pressed up just below where the incision is to be made, it will soon show prominently. Use a thumb lancet in preference to a fleam. When sufficient has been taken, raise the two lips of the wound, and bring them together between the thumb and finger, pass a common small pin through the edges and weave thread across and over to keep all in place.

RECOGNIZING AND DISTINGUISHING DISEASES. The following explicit rules for recognizing diseases in animals, should be carefully studied. Any one who would become expert in recognizing diseases in animals, must study them carefully in the healthy state, and make himself thoroughly familiar with their habits, appearance and general physiology. He must practice feeling their pulse and the heart, listening to the sounds of their lungs in breathing, and taking their temperature, by feeling the skin and also by using a properly constructed thermometer. He should watch the appearance of the eye and tongue, and note the positions assumed when asleep and awake. He should observe the character and frequency of their appetite. For it is in the variations from health in these particulars that the veterinarian discovers the guides which lead him to the recognition of the particular disease he has to treat. We will examine each of these items separately, and assure our readers that if they will verify our statements by practice on the living animals, they will soon be in a position to take charge of them when sick, quite as well and often a great deal better than the average farrier, as he is to be found in this country.

The Pulse. The pulse differs very much in the domestic animals. In the full grown horse at rest, its beats are about forty per minute; in the ox, from fifty to fifty-five; and in the sheep and pig, about as in man, that is, averaging seventy to eighty beats to the minute. In calves and colts, and in animals well advanced in years, the pulse increases, in health, to about twice these figures; and it is also increased by hot, close stables, full feeding, and the condition of pregnancy.

The pulse may be felt wherever a considerable artery passes over a bone. It is usually examined in the horse on the cord which runs over the bone of the lower jaw, just in front of its curved portion; or on the bony ridge extending upward from the eye, or inside the elbow. In cattle, it is easily reached over the middle of the first rib, or beneath the tail. There is a marked difference of force in the pulse of the two species; that of the horse being full and rather tense, while in the ox it is soft and rolling.

When the pulse differs materially from these conditions in any direction, it is a sign of disease. If rapid, full and hard, there is high fever or acute inflammation; if rapid, small and weak, there is low fever, loss of blood, or weakness. If very slow, we may suspect brain disease; if irregular, now fast and in a few seconds slow, we should look for a diseased condition of the heart.

In the sheep, the pulse is felt by placing the hand on the left side, where the beating of the heart can be felt; or at about the middle of the inside of the thigh, where the femoral artery passes obliquely across the bone.

The Breathing. The breathing is next in importance. If the ear is applied to the throat of a healthy horse or ox the air will be heard passing through the windpipe with a regular, steady, blowing sound; if applied to the chest a soft rustling murmur will be heard, like a gentle breeze in the tree-tops, caused by the air passing in and out of the fine tubes and vessels of the lungs. But where the lungs or throat is diseased, these sounds are very much changed and in many directions, which it is not necessary to dwell on here, but which will at once indicate the presence of something amiss with these important organs.

If the forefinger of the left hand is placed firmly on the chest and smartly tapped with the ends of the three first fingers of the right hand, the sound will be noticed to be more resonant and clear than when the same procedure is practiced on the solid thigh. This is because the lungs are not solid, but are always, in health, well expanded with air. But in various diseases, as pneumonia and pleurisy, they fill up with fluid and become solid; then the sound given out, by thus percussing them, as it is called, is like that on any other solid part of the animal. Hence this is another very important indication of disease.

By practice on healthy animals the character and boundaries of these sounds can be learned so closely that any variation from them will be at once detected, and will sometimes reveal the presence of an unsound condition when nothing else will.

The rapidity with which the act of breathing is performed can easily be counted by the heaving of the chest. In health in the adult horse at rest it is from 8 to 12 times a minute, and in the ox a little faster. Any great increase without obvious cause, is a positive sign of diseased condition.

The Animal Heat. The temperature of animals can be ascertained, to a slight extent, by the feel of the skin, the ears, and the legs. A hot, dry skin in a horse generally accompanies a feverish condition. Cold ears and legs are a sign of serious disease. But the only scientific, that is, accurate plan, is to use what is called a "clinical thermometer," namely, one the bulb of which can be bared and inserted into the rectum. After it has remained there two or three minutes, the mercury will accurately indicate the temperature of the blood. This in health is 98 degrees, and any deviation from this, even of a few degrees, is a certain sign of disease. Those veterinarians who have practiced sufficiently with this instrument to become skilled in its use, declare it invaluable in their business, as affording them grounds for opinions about diseases which no other symptoms could.

The Skin and Hair. The skin in its general feeling and appearance is an important guide to the condition of an animal A dry, scurfy appearance is a system of indigestion, and liability to joint affections. What is called "hide-bound" is a symptom of a general state of poor nutrition, arising from indigestion, improper food, worms, or a want of proper exercise. The skin feels stretched and hard, as if too small for the body. The condition known as "staring coat," when the hairs stand out like bristles, is often the only symptom of a low state of health. Whenever an animal is disposed to shiver, with shedding of the coat, when exposed to moderate cold, or without such exposure, it is on the verge of some disease. A persistently staring coat, without other symptoms of disease, often indicates the approach of an attack of farcy or glanders; and when with this are repeated shivers or chills, we may expect the strangles, weed, or other diseases with suppuration. When in an attack of disease the skin becomes covered with a cold sweat, the life of the animal is in great danger.

Special Signs in Cattle. In cattle, the horn at its root yields, by the sensation it imparts to the hand, a rough idea of the temperature of the blood, and the cow-leech generally feels it as the doctor does the pulse, as a part of the indispensable programme of a professional visit. If the temperature is natural, he concludes there is no fever; if cold, and the tips of the ears also cold, it is a sign of some serious internal congestion, the blood no longer circulating in natural force through the extremities.

The muzzle is another part he takes note of. In health this is moist, covered with "dew," as the saying is; but in disease, especially fever, it is dry, hotter or colder than natural, and sometimes changed in color, paler or injected with blood. By looking at the flanks, the regularity of the respiration is noted, rapid and irregular heaving there betraying the disturbance of the important function of breathing. In ruminants, also, the second mastication of the food is among the first of the vital processes to become disturbed in disease. When a cow or an ox "loses the cud," as it is called by herdsmen, that is, ceases to ruminate without apparent cause, there is sure to be a feeling of sickness about the animal which is thus interfering with one of its processes of digestion.

DISEASES. The dumb beast, like his master, man, is subject to a multitude of physical ailments. This fact often becomes a matter of serious difficulty and loss to the farmer. How to avoid disease and relieve the animal when attacked should receive no small share of his attention. He should first endeavor to keep his stock in a healthy and growing condition, but should disease or accident afflict any of them he should be prepared to restore them to their normal condition in the quickest possible time. This should be done before the animal becomes run down, or the disease chronic. The object of this treatise is to enable the farmer to care for his stock properly, and to ward off disease, and to cure the animal when afflicted.

In the treatment of diseases and description of symptoms we will not go into a learned discussion on the nature and pathology of diseases, but in the plainest and simplest language describe the diseases and the kind of treatment that should be resorted to. Great care and attention should be given to the first symptoms, as also to good nursing. Discard all strong physics and heroic treatment by purging, bleeding and the surgery of main strength. Good care and nursing is the most important means of cure. Of the non-contagious and local diseases every farmer should seek to make himself acquainted with the symptoms, so that ready means may be used for the relief of suffering animals.

In treating of these diseases and their remedies we will begin with the head.

INFLAMMATION OF THE FRONTAL SINUSES. This disease results from an inflammation of the membrane lining the cavity called the frontal sinuses, which extend from the angle of the eye to the foramen through which the brain escapes from the skull to the very tip of the horn. The symptoms of the disease is a weak cough and slight nasal discharge, the beast becoming dull and drooping, and carrying his head to one side. Grubs or worms have crept up the nostril and become a source of irritation there, or common cold has extended along the cavity, being more intense in some parts than others, and matter is generally thrown out about the root of the horns. The remedy is to open the skull at the root of the horn, or cut it off at the root. A pint or more of pus will sometimes escape, and the inflammation will be relieved by the bleeding that follows. The opening should be speedily closed after the escape of the pus. The ox often suffers from a species of fly, which creeps up the nose and lodges in the region of the sinuses.

FRACTURE OF THE HORN. If only the bone of the horn is broken, and the external covering is not displaced, nothing is necessary but to fix splints to the part, and bind well up, so that the fractured edges shall be kept securely in place, and healing will soon commence. When the horny covering is torn off, it will be best to let nature do the healing. The blood will flow freely, and, coagulating, will form a hard covering for the horn. A dense, flexible substance will begin to form at the base of the bone, which will rapidly thicken and harden, and take on the nature of good horn. This formation gradually grows up the bone to the point of the horn, and the restoration is thus complete. When the tearing off of the horny covering fractures the bone, the broken parts must be brought carefully together, in exact opposition, bound up, and confined with splints, or strong bandages. The fractured parts will speedily join, new horn grow over, and scarcely a sign of the injury will remain. When the bone of the horn is wholly separated the bone will never be reproduced, but a rude mass will be formed, half bony and half cartilaginous. In such case saw off the horn below the fracture, and pass a hot iron over the smooth end of the stub. This will generally prevent reproduction of substance. If slight formation should take place it can be destroyed by cauterization. Bind up the end as soon as possible after the operation, to prevent the ingress of air. This should be done with several layers of tar-cloth. Thus inflammation of the brain and lock-jaw may be prevented.

DISEASES OF THE EAR. The ears of cattle are not greatly subject to disease. The passage into the internal ear is tortuous and guarded with hair. The ears of cattle are, however, much exposed to contusions that produce swelling, abscess and deafness. Wash with warm water, or soap and water, and an application of a weak solution of Goulard, while much inflammation remains, and a still weaker solution of alum when the inflammation has subsided. Simple inflammation in the ear is a rare disease in cattle, and is known by the animal carrying his head a little on one side. Bleeding from the neck vein, a dose of physic, and fomentation of the part, will usually give relief; and afterwards a lotion composed of a drachm of the extract of lead and the same of laudanum added to four ounces of water; a little of this may be poured into the ear, and the organ gently squeezed so that the lotion will find its way to every part of it.

Itching of the ear and dry scurfiness, which causes it, may be relieved by an ointment composed of four pounds of lard, one of resin, and one of calamine powder, rubbed fine. Tumors in the ear must be opened, and fungus granulations cut down with a knife. Nitrate of silver must be applied to the exposed surface, and an alum wash, not too strong, afterwards used.

DISEASES OF THE EYE. When a beast is wounded in the eye, there should be no probing, but fomentations, bleeding and physic.

Bony tumors about the eyes of cattle occasionally bend toward the eye and press upon it, thus interfering with the vision. If the tumor is on the upper part of the orbit, and is attached by a kind of pedicle, it may be sawed off and the root touched with the cautery. These tumors are often obdurate and impossible to cure. When they spring from the back of the orbit no cure can be effected. When the eye becomes painful and begins to protrude, the only course is to destroy the animal. External bony tumors frequently ulcerate, and the bone becomes carious or decays. Humanity then dictates the speedy killing of the beast.

Cattle are subject to a pustular eruption on the edges of the eyelids, accompanied sometimes by great soreness and ulceration. The first remedy is the mild nitrate ointment of mercury, but it does not always yield to that; yet on the approach of winter it frequently yields spontaneously. It indicates a foul habit of body, and is often connected with mange. Purges of sulphur will be found useful, and a course of alterative medicine will do good.

A “ haw,” or flat piece of cartilage, of a semi-circular form, is found in the corner of the eye. This part is disposed to disease, inflammation and swelling sometimes taking place, causing the haw to protrude over the eye.

If the disease is connected with the inflammation of the eye, generally it will subside with that inflammation. If the part itself is diseased, the zinc lotion may be used (2 grains of white vitriol dissolved in an ounce of water, and the vitriol gradually increased to 4 grains, the application confined as much as possible to the part, and the liquid not suffered to get to the sound part of the eye). A perseverance in the zinc wash will work marvels. If it becomes necessary to extirpate the part, the beast must be cast. Keep open the eye with the fingers, pass a needle threaded with strong silk through the cartilage, and draw out the part as far as possible, and then with a pair of crooked scissors the haw may be removed. Proper care will restore the part to soundness.

To cure ophthalmia, give bleeding and physic as the constitutional treatment, and fomentations, cold lotions, opium in tincture, saturnine lotions, as local applications, the opium during the acute stage, the lead as soon as the inflammation begins to subside, and the zinc when the inflammation is nearly subdued.

ABORTION. Abortion may be said to take place in cows when the fœtus is expelled 35 days before the normal period. It may occur from a variety of causes, and is much more common during the first half of the normal period than during the latter.

Symptoms. The cow, in this condition, is somewhat off her feed, she is listless and dull, the milk diminishes or dries up, the motion of the fœtus becomes more feeble, and at length ceases altogether, there is a slight degree of enlargement of the belly; and a little staggering in her walk. As the abortion approaches, a yellow or red glairy fluid runs from the vagina (this is a symptom which rarely or never deceives), her breathing becomes laborious and slightly convulsive. At length labor comes on, and is often attended with much difficulty. Among the causes may be mentioned fright, blows, falls, overdriving, the eating of grain, hay or grasses containing ergot, nauseating smells, mow-burned or rusty hay, etc. A cow that has once aborted is liable to do so again. When a cow in a herd has aborted, others are liable to follow. Remove the aborting cow, together with the calf and the afterbirth, from the field or stable, and disinfect the stall with chloride of lime or a strong solution of copperas. With a view of prevention it is necessary to ascertain the cause. If due to ergot, grass, or other deleterious plants, remove the cows to other pasturage. When due to musty or bad hay, discontinue its use.

The bull should not go loose among cows that are in calf. *The fœtus must be got rid of immediately.* It should be buried deep, and far from the cow pasture. Proper means should be taken to hasten the expulsion of the placenta. A dose of physic should be given; ergot of rye administered, the hand should be introduced, and an effort made, cautiously and gently, to detach the placenta. The parts of the cow should be well washed with a solution of chloride of lime or carbolic acid, which should be injected up the vagina, and also given internally. The cow when beginning to recover, should be fattened and sold. This is the first and grand step toward the prevention of abortion, and he is unwise who does not immediately adopt it. Should the owner be reluctant to part with her, two months, at least, should pass before she is permitted to return to her companions.

ANBURY OR ANGLE BERRY, a sort of fleshy excrescence to which cattle and some other animals are subject under different circumstances, and are supposed to proceed from a rupture of the cutaneous vessels, which give vent to a matter capable of forming a sarcoma or fleshy excrescence. They frequently appear upon the belly and adjacent parts hanging down in a perpendicular manner and may be removed by means of ligatures being passed around their base or by the knife. After removal, apply caustic to effectually destroy the parts from which they arise.

APOPLEXY. This is a determination of blood to the head. Animals attacked with this disease are generally in a plethoric condition. The usual symptoms are coma (a sleepy state), eyes protruding, respiration accelerated; finally the animal falls, struggles and dies.

Treatment. Treat the case, by way of prevention, with low diet. No treatment, however well directed, is of any use when the disease has once manifested itself. Life is prolonged a few hours by blood-letting, but no cure can be effected.

APHTHÆ OR THRUSH. This is an eruption in the mouth similar to small bladders, and is often mistaken for a contagious disease called epizootic aphthæ. The cause is irritation in the mouth of young cattle from teething.

Treatment. If treatment is at all necessary a weak mixture of vinegar and cold water will answer, or a solution of alum (alum water) applied to the mouth twice a day, will be all that is needed.

BLACK-LEG, JOINT FELON, QUARTER EVIL. A malignant and rapidly fatal disease, the first symptoms of which are lameness, sometimes in the fore, sometimes in the hind leg; puffy and blood-shot swelling of the shoulder or hinder parts, as though the animal had been beaten with a heavy, dull instrument. Young steers, up to the age of three years, are most liable to the disease, particularly those which have become suddenly fat. The great difference between the temperature during the day and night at this season favors the development of the disease. The cattle should be removed to an elevated dry ground. If the hay fed is from marshy ground, or from ground upon which animals have recently died, it should be replaced by hay you are sure contains no traces of the disease. The water supplied should be pure and sweet, and not derived from surface drainage nor charged with decomposing organic matter. The hay should be sprinkled with a solution of carbolic acid to the amount of 1 dram of the acid daily to each animal. The following draught may be given night and morning for some time: Nitro-muriatic acid, 60 drops; iodide of potassium, ½ dram; water, 1 pint. Should the nights be cool, it might be advisable to provide comfortable sheds for the stock.

BLACK TONGUE: see Bloody Murrain.

BLACK WATER. This is an exaggerated stage of what is known as Red Water, to which the reader is referred.

BLAIN, ANTHRAX, GLOSSITIS. When bloody murrain attacks the tongue it is called blain. In the case of blain it is recommended to open the pustules freely from end to end, with a sharp lancet, before the poison has been absorbed. Treat the same surface freely with the following: 20 grains of chloride of lime, 1 ounce water. Mop the parts freely. Sulphuric or nitric acid, nitrate of mercury, lunar caustic and other strong caustics are equally good. When it may be accomplished, burning with a hot iron is advised.

BLOODY MURRAIN. Contagious anthrax, known also as charbon, black leg, black quarter, black tongue —is so called because the parts turn black, owing to decomposition of the blood. It arises undoubtedly from contagion, eating bad food, pasturing on swamp lands in summer, drinking stagnant water, etc. Whatever the poison, it is certain that it has wonderful tenacity of life; every part of the animal will carry it, even the excrement. Flies will carry it; a yoke worn by a deceased ox retains it. Even alcohol is said not to be able to kill the poison. Fortunately it rarely occurs in its truly malignant form. There are many types of the disease, attacking particular parts. In the tongue it is known as black tongue, or blain; in the throat as putrid sore throat. When it attacks the bowels it is called Bloody Murrain.

In this disease it must be remembered that in its malignant form it attacks not only cattle and horses, but all the other herbivora, swine and birds. It is communicable to other and different animals by inoculation, showing itself in different forms, but all characterized by the breaking down of the globules, rupture of tissues and letting out blood and albuminous fluids, with gangrene, yellow or brown mucous membrane, enlargement and sometimes rupture of the spleen, and a very high death rate.

Preventives. Upon the first intimation of the disease the animals of the herd should be removed to clean, new pasture, where there is pure water. Avoid all bleeding, purging, and lowering medicines. The animals must be kept up. So all local applications to the swellings seem useless. A seton, composed of a yard of broad, coarse tape, inserted in the dewlaps, turned every day and smeared with irritating ointment, might prove beneficial. This should remain in from four to six weeks. Youatt and others advise the following: 2 to 4 drachms chloride of lime, 1 ounce prepared chalk, 2 drachms laudanum.

Mix and give in a pint of warm gruel every two or three hours.

Recent French authors, in treating the malignant form of the disease, recommend quinine, 1 or 2 drachms, repeated every two or three hours in severe cases. Also hypodermic injections of a solution of iodine as follows: 2 grains iodine, 5 grains iodide of potassium, 1 ounce water.

Use a syringe full every hour in severe cases. In extreme ones, it is advised that this be thrown directly into the veins; also that the strength be kept up by stimulants; among those recommended most strongly is carbonate of ammonia.

BRONCHITIS. This is inflammation of the windpipe, extending often to the lungs themselves. Bronchitis, and throat and chest diseases in cattle, are insidious and deceptive, for the ox does not, even under the most severe forms of these, exhibit fever, high pulse, irritation, loss of appetite, etc., which are shown at once when attacking the horse. Not until the disease has made considerable progress does the ox, or cow show symptoms of disease. Careful observation and close attention is demanded on the part of farmers to discover the early symptoms of this disease. When anything in the least unusal is discovered, such as a very slight grating sound in the windpipe when the ear is steadily applied, the cow should immediately have some iron, or tonic powders, and all will be well in a few days. Farmers, if you study the sounds in the windpipe, both in the sick and well animal, then you will not only be able to detect those insidious diseases in the beginning, but can apply the remedy also. In this way you can prove to your neighbors that cattle diseases are not so difficult to cure after all; and while they are brooding with sour, sullen minds over their losses, and the ignorance and inefficiency of cow doctors, you have obtained a mastery of the situation.

Bronchitis is a disease which rarely attacks one animal only, but usually most of the herd will have been attacked before it leaves the place, and then it will leave when there are no more victims to seize. These epizootic diseases depend upon what is called atmospheric causes. Such conditions are usually manifested in the spring of the year, and sometimes early in the summer. The peculiarity of the air causes irritation of the fauces, the mouth, throat or windpipe, and, as before stated, sometimes extends to the chest and lungs themselves.

Symptoms. In a week or so after the attack, a slight husky cough, with weeping from the eyes, and a watery discharge from the inner corner of the nose, will be seen; and by applying the ear to the course of the windpipe, a slightly rough and grating sound will be heard. This sound, however, can be heard in twelve hours after the attack. According to the amount of serum poured out, and whether the cow be in calf, and how far she is gone in calf, so will the quickness and depth of the breathing be. Bronchitis is a forerunner of pleuro-pneumonia.

Treatment. If the disease is discovered within 48 hours from the attack, take from four to five doses of the tincture of aconite root, 25 drops to a dose, and give one dose every four hours. If there be uncertainty as to whether the disease has extended longer or shorter, to save time, the aconite may be given along with the following powders, three times in the day: Powdered sulphate of iron, 3 drachms; powdered gentian root, half an ounce; powdered ginger root, half an ounce; powdered sulphate of soda, half an ounce; mix, and make a drench, to be poured down the mouth out of a strong bottle. This medicine is to be continued (omitting the aconite after the fifth dose) till the animal is well, or looks brighter, and eats all it gets. If it be a milch cow, the usual quantity will be given. In addition to the above medicines, give, once or twice daily, half an ounce of commercial sulphuric acid, largely diluted or mixed in half a bucket of cold water. In feeding, care should be taken not to give too much, so as to bring on dangerous indigestion. Cold water and pure air are indispensable agents in the treatment of this and all diseases of horses and cattle.

Choking is most commonly brought about by the cows feeding on roots, especially round and uncut ones, such as the potato.

If not too large, the obstruction may often be removed by the introduction of a hollow, flexible tube. If low down, a pint of linseed or olive oil will aid the operation, which must be very cautiously performed for fear of lacerating the gullet. In case of great swelling, a dose of chloride of lime or ammonia should be given after the removal of the obstruction.

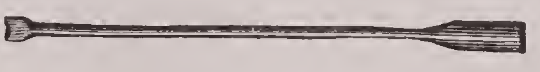


FIG. 35.—*Probang.*

When a cow is choked with a nubbin of corn, turnip, pumpkin rind, or any other thing, the obstructing article should be pushed down into the paunch with a probang (Fig. 35), which is simply a wooden rod with a cup-shaped excavation at the end opposite the handle. One should be kept at hand on the premises.

CONSUMPTION. This affection is the termination of the chronic disease of the lungs. These organs become filled with many little cysts, or sacs, containing a yellowish-white fluid, which in time is hardened, producing a condition of the lungs known as tuberculous. These tubercles in time undergo another change, becoming soft in the center and gradually involving the whole of the hardened parts, which, uniting with adjoining ones, soon form cysts of considerable size. Like consumption in individuals, it is very seldom, if ever, cured, and it is better if the animal is not too poor in flesh, to have it slaughtered.

CORYZA, or nasal catarrh, commonly called a cold in the head, is not very common among cows. The animal will be observed to sneeze often; cough sometimes accompanies; there is also a discharge from the nose. Neglect to attend to these early symptoms frequently occasions disease of a more serious nature; in fact, coryza may be regarded as the forerunner of all epizootic, pulmonary disorders.

Treatment. The animal should be kept on a low diet for a few days; the nostrils occasionally steamed, and one of the following powders given night and morning, which, in most cases, will be all the medicine required: nitrate of potassa, 1 ounce; digitalis leaves pulverized and tartrate of antimony, of each 1 drachm; sulphate of copper, 2 drachms; mix and divide into eight powders. Should the disease prove obstinate, give for two or three days 2 ounces of Epsom salts at a dose, dissolved in water, three times a day.

COW-POX. This is a simple affection of the skin of the udder, which has claimed much notice on account of the valuable benefit conferred by it upon the human family, in furnishing the material for vaccination. The cause of this disease is at present unknown. It is a contagious eruption, running a fixed course, and accompanied by slight fever.

Symptoms. Teats painful, slightly swollen, a faint blush upon the udder, and in about three to four days red, hard spots are seen, succeeded by red patches, which, in from a few days to a week, form bladders containing the true vaccine lymph..

Treatment. Foment the teats well with warm water and Castile soap, after which, wipe the bag dry, and dress with citrine ointment. Iodine is also recommended; or, to 1 pint of glycerine add 1 drachm of fluid carbolic acid.

CROUP. Stridulous croup in animals is rare, but it is seen occasionally in milch cows, and is very fatal, from the fact that it is situated in the larynx, which speedily causes suffocation, unless the windpipe be opened with a knife to admit of the act of respiration till the swelling of the head of the windpipe has passed off.

Cause. Cold attacking the head of the windpipe, followed by inflammation, and the development of false membranes.

Symptoms. Loud, stridulous noise or murmur, quickened breathing, fever, and threatening suffocation of the animal, cough and distress.

Treatment. Place the animal in the open air, if in summer time, in the shade, and give aconite, in the form of tincture, 25 drops to a dose. This will allay the excitement, fever and irritation. If this gives relief, repeat the dose in a few hours again. But on the contrary, there being no relief in half an hour, give no more aconite, nor indeed anything else. There will be but one of three things to be done; either to kill the beast, if it be in good condition, and fit for market; or wait for the animal to die, or have the boldness to cut out a hole in the windpipe, about the middle, on the front of the neck. In case the latter is preferred, tighten the skin on the front of the windpipe, and make a clean cut far down the center, and through the skin; when the white, shining windpipe is brought to view, have an assistant to hold the edge of the skin back out of the way, till a hole is cut out of the cartilages of the tube, as large as a fifty-cent piece. This will give instantaneous relief. The hole will gradually fill up, and close again without any trouble whatever.

CUD, LOSS OF. In most internal diseases of cattle, the functions of the organs of digestion become more or less impaired, whereby the natural act of re-mastication, more commonly known as "chewing of the cud," becomes temporarily suspended, and which is called "losing the cud." Treatment must necessarily vary with the nature of the ailment which produces this symptom of impaired digestive functions. The treating or attempting to treat one of the symptoms of any disease, which may be remote from the digestive organs, would lead to nothing but loss of time and risk of the life of the animal, if the original disease happens to be a serious one. The administration of a laxative dose of salts would in most cases prove beneficial, and at all events would do no harm, such as a pound of Epsom salts dissolved in a quart of hot water, and to which solution may be added a pint of molasses and an ounce of ground ginger.

DIARRHŒA is brought on by a sudden change from dry to green food, sometimes by impure water or poisonous plants. If slight, it need not be checked; if prolonged, a mild purgative may assist nature. A few ounces of pulverized charcoal will sometimes check diarrhœa. Half a pound of Epsom salts, with a little gentian and ginger, will be sufficient for a moderate-sized animal. This may be followed in a day or two by an astringent composed of 2 drachms of powdered catechu, 1 drachm powdered opium, 4 drachms of powdered ginger, 1 ounce of powdered oak bark, and 2 ounces of prepared chalk. Mix together and give in a quart of warm gruel.

DYSENTERY. This, when seated, is a troublesome and dangerous disease. The cow strains painfully to pass her dung. This is slimy, thin, olive-colored and offensive. Bubbles form on the top, carrying slime on them. The animal is quite restless. When the hair stands out from the body the disease is generally fatal. It is frequently brought on by poor feeding in the winter

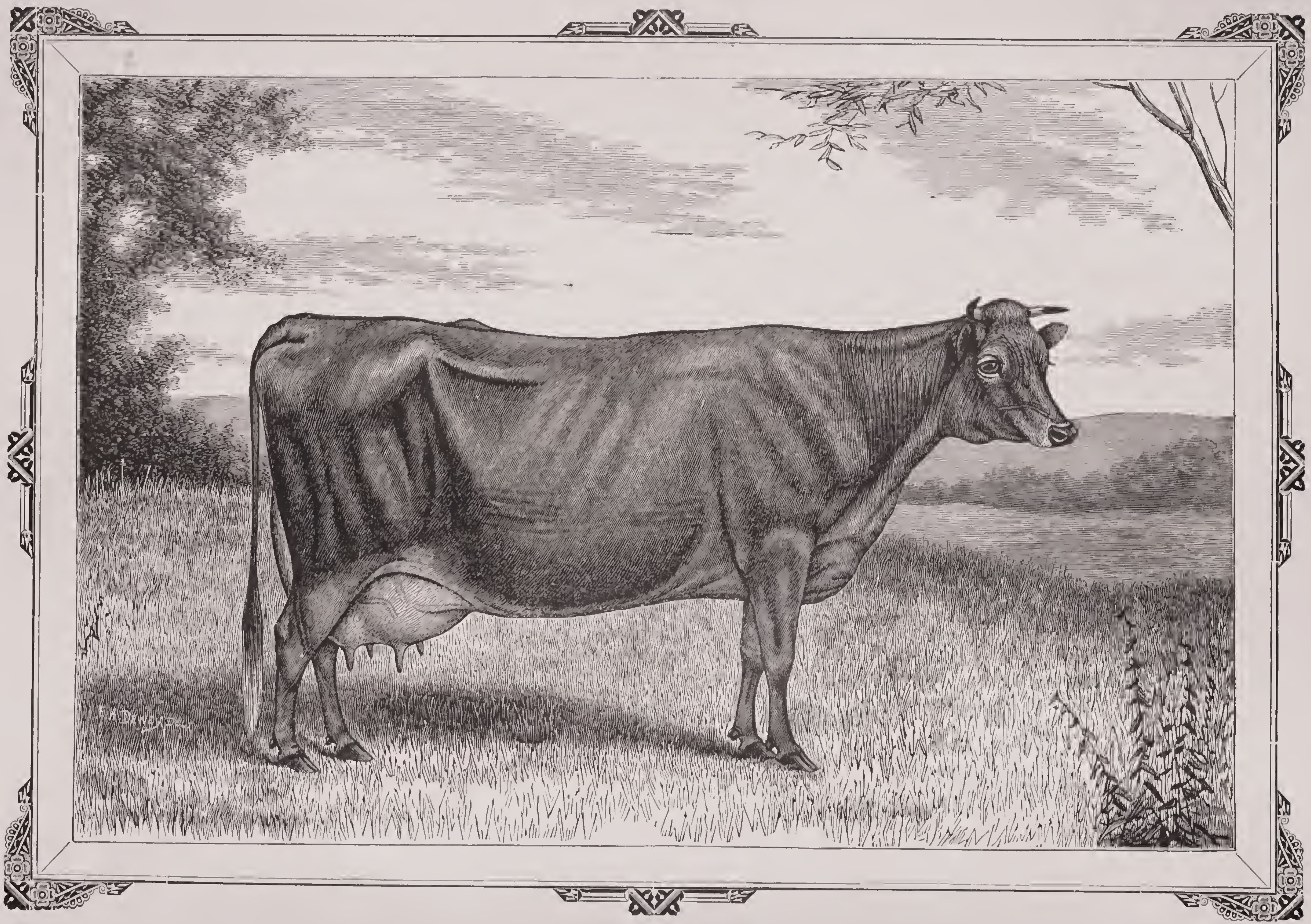


Fig. 6.—JERSEY COW.

and exposure to sudden changes of temperature. Good nursing is needed, and much the same treatment as in the case of diarrhœa.

ENTERITIS. This is an inflammation of the external or internal coat of the intestines, sometimes attended with violent purging, especially when it is confined to the internal coats. Oxen in good condition are more subject to this disease than are cows. It most frequently occurs in dry, hot weather.

Symptoms. The animal is dull and not disposed to move about; the muzzle is dry, and the coat staring; the animal yields, on pressure of the loins; a weak, staggering gait when forced to move; eyes red, full and fiery; head protruding; mouth, ears and horns hot; appetite bad; the bowels become constipated, the animal moans continually and froths at the mouth. Cause, exposure to cold, or drinking cold water when overheated with work; exposure to hard work in sultry weather; the use of stagnant, impure water; the crowding of animals into a confined place.

Treatment. First give 30 drops of tincture of aconite every four hours for one day, then give 1 ounce of cardamom, 1 ounce of sulphuric ether, 1 ounce of tincture of gum catechu, 1 ounce of pulverized chalk, 1 ounce of charcoal, in linseed tea. In severe cases of purgation 1 ounce of barberry bark may be occasionally added.

EPIZOOTIC APHTHÆ, although a contagious febrile disease occurring in cattle and sheep, and communicable by transmission to swine and even man, it is fortunately rarely fatal, and is characterized in animals by an eruption of small blisters in the mouth, between the clefts of the hoofs, and along the upper margin of the coronet. It is a specific poision of obscure origin, remaining in the system from one to four days before producing its characteristic symptoms.

Symptoms. There is an increase of temperature in the body, followed by an eruption of small blisters, of the size of a dime, situated on the tongue, the roof of the mouth, inside the lips, and occasionally on the udder. The blisters in the cleft of the hoofs and around the coronet and heels, are identical with the others, but smaller. Diseases of this class have the same relation with inferior animals that epidemic diseases have to man. They occur at all seasons of the year, but more generally prevail in the spring and fall. The period of their duration varies from months to years. They are at times mild in their attacks, and yield readily to proper treatment. At other times they become painful pestilences, destroying everything in their course when once fairly established in a place. It is almost a certainty that all cattle will take it, some developing it sooner than others. To save time and expense, immediately inoculate every one of them. By producing the disease in this way a week or two will see the last of it, and by good care not much time or loss will have been incurred. The milk of cows affected with this disease is poison. Calves by drinking such milk will perish in great numbers.

Treatment. Apply to the sores a lotion of 2 drachms of sulphate of zinc in 1 pint of water.

FOUL IN THE FOOT. FOUL CLAW. A local affection, consisting of sores or ulcers, first appearing between the claws. Sometimes a swelling shows itself near the top of the hoof. The cruel practice of drawing a rope back and forth over the affected parts ought to be abandoned. A knife is all that is needed to remove the loose matter; the parts should then be carefully washed with a sponge. Where the case has been allowed to go far, and the pasterns are tender and swollen, the parts should be dressed with an ointment composed of 1 part of sulphate of iron to 4 parts of molasses. Apply on cotton batting and tie over the affected parts. If there is any fungus or other morbid growth, sprinkle equal parts of alum and powdered bloodroot on the sore. Some administer a dose made of 2 ounces of burdock, 1 of powdered sassafras bark and ½ an ounce flowers of sulphur. Steep in boiling water, and when cool, strain. If the flow of pus is not checked, wash, morning and evening, with solution of 1 tablespoonful of common salt in 1 pint of water. Or, take oil of tar and tincture of arnica, 4 ounces each, and 1 drachm of carbolic acid, fluid, mix well and apply three times a day.

GARGET is an inflammation of the internal substance of the udder. One or more teats, or whole sections of the udder, become enlarged and thickened, hot, tender and painful. The milk coagulates in the bag, and wherever deposited, causes inflammation accompanied with fever. It is most frequently met with in young cows after calving, especially when they are in too high condition. The secretion of milk falls off, and in some cases stops altogether. The milk is sometimes thick and bloody. In severe cases, the hind extremities, as the hip-joint, hock or fetlock, are swollen and inflamed to such a degree that the animal cannot rise. In mild cases, the simplest remedy is to put the calf to its mother several times a day. By restoring the flow of milk this will often remove the congestion. Sometimes the udder is so swollen that the cow will not let the calf suck. If the fever increases, the appetite fails and rumination or cud-chewing ceases. When this is the case a skillful veterinary surgeon should be called in. Usually, in mild cases, a purgative and frequent washing of the udder dispel the trouble. The physic should consist of 1 pound of Epsom salts, ½ an ounce of ginger, ½ an ounce of nitrate of potash, dissolved in a quart of boiling water; add a gill of molasses and give to the cow lukewarm. The diet should be moderate: bran and, in summer, green food. The udder should be frequently examined and any matter found forming there be at once released. The causes to which this disease is most frequently attributed are: exposure to cold and wet, or want of proper care and attention to the cow during parturition. Hasty drying up of a cow often gives rise to inflammation and hardness of the udder, which is found difficult to remove. Another is failure to milk a cow clean.

Treatment. While the cow is suffering from this complaint, the calf should be permitted to run with her often, and the cow milked as clean as possible at least twice a day. In case the udder is feverish and hot, a wash may be used, 2 ounces of camphorated spirit and 8 ounces of vinegar; the whole thoroughly mixed and applied just after milking and washed off carefully before milking again. In extreme cases, iodine ointment, containing 1 drachm of hydriodate of potash to an ounce of lard, well mixed, may be used. A piece the size of a pigeon's egg to twice that amount should be well rubbed into the swollen parts, morning and night. When milk forms in the bag before calving, so as to swell the udder, it should be milked away; a neglect of this precaution frequently leads to violent attacks of garget. The liability to this disease engendered by the mixing of the old milk with the new secretion is one of the main reasons for letting the cow run dry a month or so before calving, if there is any likelihood of an attack from the opposite course being followed. Fat induced by high feeding after drying off is a frequent cause of this disease; it should, therefore, be avoided.

Gastro-Enteritis arises from eating the buds of oak, young ash and other trees which are of a very highly stimulating or irritating character.

Symptoms. Loss of appetite and suspended rumination; mouth hot and frothy; skin dry; pulse from 60 to 70; swelling and pain of the belly; fæces hard and covered with blood; urine of a strong odor, highly colored.

Treatment. Bleed and administer a strong purgative. Follow by aconite and belladonna as in enteritis. Injection of Castile soap and water should be used; also mustard, hartshorn and water to the belly.

Hoose in Calves. This is a common disease in breeding districts, and is very fatal in its results, attacking young calves. It is a parasitic disease.

Cause. The presence of minute worms in the bronchial tubes. These worms are called *filaria bronchi*, and inhabit the windpipe of cattle, sheep and lambs.

Prevention. Keep calves, sheep and lambs on dry land, where there is no marsh, wet land or meadow.

Symptoms. Constant husky cough; difficulty in breathing; emaciation, and loss of appetite. Thus the disease goes on from bad to worse, until death takes place in from two to three weeks, depending much, however, upon the age of the beast.

Treatment. Linseed oil, 2 ounces; oil or spirits of turpentine, ½ an ounce; mix these well together This dose is for a calf six months old. It should be repeated every two days. Give the calves good feed, such as oil cake, etc. Another form, and a good one, which is generally used in sheep to save expense and trouble, is to get them together, and drive them into a pretty close house or shed, no larger than will hold all the affected ones. Then procure an earthen bowl or basin, containing one ounce each of common salt and oxide of manganese, and pour over this mixture, say, water, ½ an ounce; sulphuric acid, 1½ ounces; stir with a stick, and chlorine gas will be evolved. When sufficiently stirred, leave the place and close the door. Repeat the inhalation for two or three times, and let two days pass before each subsequent inhalation. If the animal is much weakened by the parasites, mix caraway and fenugreek in their feed, of each a quarter of an ounce, once a day for a week or so.

Hoove, or Hoven, in Cattle, is flatulent colic and caused by eating too much wet grass, especially clover. Fermentation takes place and generates carbonic acid gas in large quantities, and if not relieved speedily, will end fatally in a few hours. To get rid of the gas, give every half hour: 1 ounce chloride lime, 1 ounce hypo-sulphite soda, 1 qt. water. The common soda will do where the hypo-sulphite can not be procured. If this fails to give relief, which it seldom will, resort must be had to the trocar, Fig. 36, which every farmer should be provided with.

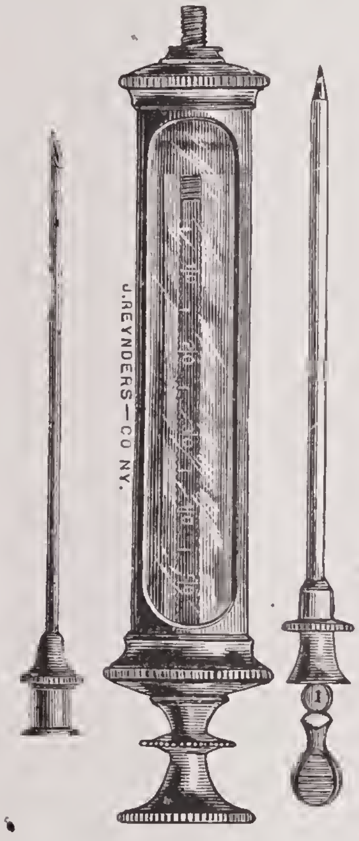

J. REYNDERS—CO NY.

Fig. 36.—*Trocar.*

Thrust it into the left flank half way between the short ribs and the haunch bone, and midway from the top of the back to the belly. A common knife will do in the absence of the trocar. Fig. 34 represents a hypodermic syringe and canula, with the trocar.

Inflammation of the Bladder. The symptoms of this disease are frequent efforts to stale, passing but few drops of urine at a time; pulse full and rapid; eyes bloodshot; appetite lost; moaning, and walking with a staggering gait.

Treatment. Inject into the bladder one quart tepid water, and from one to two ounces of tincture of opium mixed together in slippery elm bark water. Give internally one of the following powders every hour until relieved: nitrate of potassa, one ounce; tartrate of antimony, and pulverized digitalis leaves, each one drachm; mix and divide into six powders.

Inflammation of the Liver. Diseases of the liver are of very common occurrence, a fact with which all beef butchers are familiar. Perhaps no organ in the animal economy is so liable to disease. The obscurity of the symptoms and the good condition of the animal prevent its discovery, as a general thing, during its lifetime. When, however, the disease assumes an active form, known as the yellows, jaundice or inflammation of the liver, the symptoms are more readily detected.

Symptoms. A yellowish color of the eye will be observed; skin, urine, etc., highly colored; soreness, on pressure, on the right side; loss of appetite; dullness; constipation of the bowels, etc.

Treatment. Calomel is the most reliable medicine known to practitioners for diseases of the liver. Its abuse, however, has brought it into disrepute. Yet, as

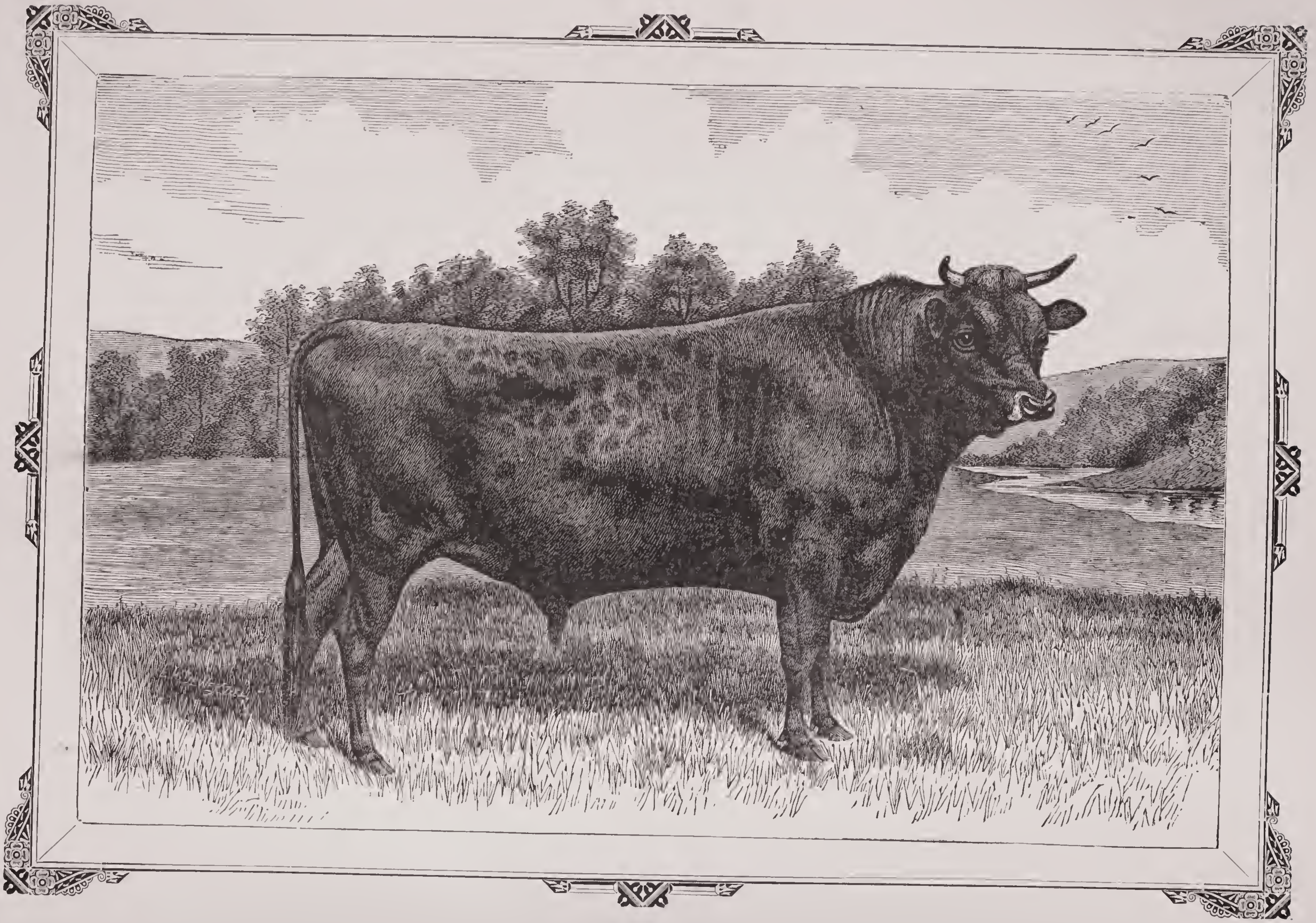


Fig. 7.—JERSEY BULL.

with ordinary care it may be advantageously used, we will prescribe it as that upon which the most dependence is to be placed, and in doing so, will endeavor to have it used safely. Bleeding has been recommended by some, but no good result has ever been obtained. Give Epsom salts in doses of four ounces each, with one scruple of calomel, until the animal is relieved. Mustard and water should frequently be applied to the right side, and well rubbed in.

JAUNDICE, ICTERUS. This is a common disease in the ox, from the fact that he is supplied with a gall-bladder, and gall in great quantity. Jaundice may be properly biliary intoxication, or distribution of bile throughout the whole circulation of the blood.

Causes. Closure of the biliary ducts in the liver, and the consequent absorption of the bile into the stomach. The bile duct may be closed from gall-stones.

Symptoms. In the white skinned oxen, jaundice is seen at once from their yellow color. In dark-colored animals we are satisfied to examine the lining of the mouth, nose and eyes, for this yellow appearance. In addition to these signs, we have dullness, and costiveness, while the dung is of whitish or straw-colored look.

Treatment. If the symptoms be not very prominent, the animal may be left with safety to the powers of nature, which can be assisted by giving slop food or placing it upon bare pasture for a few days. If the case be more of an acute kind, give a dose of purgative medicine, as follows: Epsom salts, one pound; table salt, half a pound; ginger, half an ounce, mix, and dissolve in four bottles of water, sweetened with molasses.

LICE. Cattle are often subject to lice, particularly when they are neglected, half starved and in poor condition. Good care and good feeding, in connection with the treatment recommended in Mange, to which the reader is referred, will comprise all that is requisite.

LOCK-JAW. Kill the beast and dress it for market as soon as it is known that it is lock-jawed.

MALIGNANT CATARRH. Caused by feeding in damp, cold situations, and feeding on marshes in peculiar seasons. Low, wet river bottoms are most apt to give it to stock. The disease somewhat resembles the Russian cattle plague, but is not usually contagious. Professor James Law gives symptoms and treatment as follows:

Symptoms. A slight diarrhœa may be followed by costiveness, the dung being black, firm and scanty. The hair is rough and erect; shivering ensues; the head is depressed; the roots of the horns and forehead hot; eyes sunken, red, watery, with turbidity in the interior and intolerance of light; muzzle dry and hot; mouth hot, with much saliva; the membranes, mouth, nose and vagina blush-red; pulse rapid; impulse of the heart weak; breathing hurried; cough; urine scanty and high-colored, and surface of the body alternately hot and cold. In twenty-four hours all the symptoms are aggravated; the nose discharges a slimy fluid; forehead is warmer and duller on percussion; the mouth is covered with dark red blotches, from which the cuticle soon peels off, leaving raw sores; appetite is completely lost; dung and urine passed with much pain and straining, and there is generally stiffness and indisposition to move. From the fourth to the sixth day ulcers appear on the nose and muzzle, swelling takes place beneath the jaws, chest and abdomen, and on the legs the skin may even slough off in patches; a fœtid saliva drivels from the mouth and a stinking diarrhœa succeeds the costiveness. Death usually ensues from the eighth to the tenth day, preceded perhaps by convulsions or signs of suffocation.

Treatment. Clean the bowels with the following: 1 pint olive oil, 1 ounce laudanum; mix. In eight or ten hours, if it does not operate, give another. Follow this with diuretics—sweet spirits of nitre in half-ounce doses; and also with antiseptics, potassa chlorate, in doses of one-quarter drachm. Wet cloths should be kept on the head; the mouth and nose sponged with quite a weak solution of carbolic acid. Give as food only soft mashes.

MANGE. Mange, or leprosy, is one of the most unpleasant and difficult diseases to manage of all the ailments to which cattle are subject, requiring the nicest care and attention to render it easy of cure. An animal badly nursed will not, under the most skillful treatment, quickly recover. Its causes are, in the main, due to poor food, which produces a debilitated condition of the system, and, in connection with a want of cleanliness, causes a development of the acari, or minute insects, exciting very great irritation upon the skin and causing the cow to rub herself against every object with which she comes in contact. The hair falls off, a scurfy appearance of the skin is perceptible, and the animal is poor in condition and milk. The great trouble in treating this disease springs from its contagious character; for no sooner is the animal, ofttimes, once free from the acari than it comes in contact with some object against which it has previously been rubbing, when the acari which were left upon that object are again brought in contact with the animal and the acari and the disease are reproduced. If, immediately after the proper applications are made, the animal is removed to other quarters, and not allowed to return to the former ones for six or eight weeks, there is, generally speaking, but little trouble in treating the disease.

Treatment. Take the animal upon a warm, sunny day, and with a scrubbing-brush cleanse the skin thoroughly with Castile soap and water; when dry, apply in the same manner the following mixture: white hellebore, 1 ounce; sulphur flowers, 3 ounces; gas-water, 1 quart; mix all well together. One or two applications are generally all that will be required.

Give internally one of the following powders in the feed, night and morning: flowers of sulphur, 2 ounces; black antimony, 1 ounce; nitrate of potassa, 1 ounce; mix and divide into eight powders.

MILK FEVER. Milk fever occurs from the first to the third day after calving,—rarely after the third day. It is seldom met with before the fourth calving, then attacking chiefly cows of select breeds, and good milkers. Milk fever consists in inflammation of the womb, which sometimes even extends to the bowels.

Symptoms. Loss of appetite; chewing the cud, or rumination, ceases; staggering gait; wild look; fall and cannot rise. If the disease is not checked the brain will soon be affected also, when the cow will dash about with her head and horns plowing the ground.

Cause. Undue determination of the blood to the womb from over-feeding before and immediately after calving, and from sudden changes of the weather at the time of calving.

Prevention. Give, one week before calving, 1 pound Epsom salts, ½ pound of table salt, and ½ an ounce of ground ginger, mixed in 4 bottles of cold water and sweetened with molasses. Let the cow's feed be of the lightest kind, such as hay and thin slop mashes, and no meal, grain or solid food. This measure will lessen the tendency to interruption of the circulation, and will improve the health and tone of the whole system. To avoid, as much as possible, the effects of sudden changes of weather, have the cow brought into the barn. When the milk fever is anticipated, give, a few hours after calving, 25 drops of tincture of aconite root, which may be repeated every six hours, till four doses have been given.

Treatment. When the disease is present, give at once 30 drops of tincture of aconite root, and ½ an ounce of pure opium in powder, in a bottle of thin gruel. The aconite must be repeated every 4 hours without the opium, until 4 or 5 doses are given. Place chopped ice in a bag on the forehead, and attach it to the horns, renewing it when wanted. This being done quickly, at more leisure get Epsom salts, 1 pound; table salt, 1 pound; ginger, ½ an ounce; mix and dissolve in 4 bottles of cold water, with a little molasses to sweeten it, and give at one dose. After this medicine has been given, turn the cow from side to side every 4 hours, or when the aconite is given, which will save labor and unnecessary excitement to her. She should be left as quiet as possible, and her legs and body kept warm, thereby relieving the womb to that extent. Do not deny pure air, nor plenty of cold water to the afflicted animal, for she not only needs them, but they are indispensable to sure and perfect recovery in most diseases, and as much so if not more in a disease of this kind.

MURRAIN. The proper meaning of this word is, to die; but it and the term Cattle Plague are applied indiscriminately to diseases by many cow doctors in order to mystify the farmers. They may give the name of murrain to any disease or diseases, however different the one may be from the other in sign, symptom and result, providing the beast die. It will be observed, however, that if the animal should live, murrain cannot be its proper name. Murrain, as applied to cattle diseases, conveys no idea of the nature or seat of the disease. In some parts of the world murrain is applied to epizootic aphthæ, a disease affecting the mouth and feet, and not deadly or fatal. Without fatality there can be no murrain, and the absurdity of the name will be apparent to every farmer; and they should not permit themselves to be mystified by veterinarians applying this name and that of cattle plague to diseases they know nothing about.

NAVEL-ILL. Inflammation of the navel in calves occasionally occurs, causing redness, pain, and sudden swelling in the part affected. This disease, if not promptly attended to, speedily carries off the creature.

Treatment. Foment the part well with warm hop tea; after which, the application of a cloth, well saturated with lead-water and secured by bandages, should be applied. Internally, doses of Epsom salts, of 2 ounces each, dissolved in a pint of water, should be given until the bowels are acted upon. After the inflammation has subsided, to counteract the weakness which may follow, give a bottle of porter two or three times a day.

PHRENITIS. Inflammation of the brain is one of those dreadful diseases to which all animals are liable. It is known to the farmer as frenzy, mad staggers, etc. The active symptoms are preceded by stupor; the animal stubbornly stands in one position; the eyes are full, red and fiery; respiration rapid; delirium soon succeeds; the animal, bellowing, dashes wildly about, and seems bent on mischief, rushing madly at every object which comes in its way. The causes of this disease are overwork in warm weather, a plethoric condition of the system, and stimulating food.

Treatment. As this is attended with considerable risk, unless it is taken prior to the frenzied stage, bleeding almost to fainting should be resorted to, and followed by a brisk purge. Take 1 ounce of Barbadoes aloes, and 10 to 15 drops Croton oil; mix the aloes with 1 pint of water and the oil, using the mixture as a drench. One pound Epsom salts will answer the purpose very well, in cases where the aloes and oil cannot be readily obtained. Application of bags of broken ice to the head is very beneficial. Spirits of turpentine, or mustard, together with spirits of hartshorn and water, should be well rubbed in along the spine from the neck to the tail.

PLEURISY. This is an inflammation of the pleura, or the serous membrane which lines the cavity of the cow's chest, and which is deflected over the lungs. Inflammation of this membrane rarely occurs in a pure form, but is more generally associated with inflammation of the tissues of the lungs. If this disease is not attended to at an early period, its usual termination is hydrothorax, or dropsy of the chest. The same causes which produce inflammation of the lungs, of the bronchia, and of the other respiratory organs, produce pleurisy.

Symptoms. The respiration is quick, short and painful; pressure between the ribs produces much pain; and a low, short, painful cough is present; the respiratory murmur is much diminished,—in fact, it is scarcely audible. This condition is rapidly followed by effusion, which may be detected from the dullness of the sounds, on applying the ear to the lower part of the lungs. The febrile symptoms disappear; the animal for a few days appears to improve, but soon be-

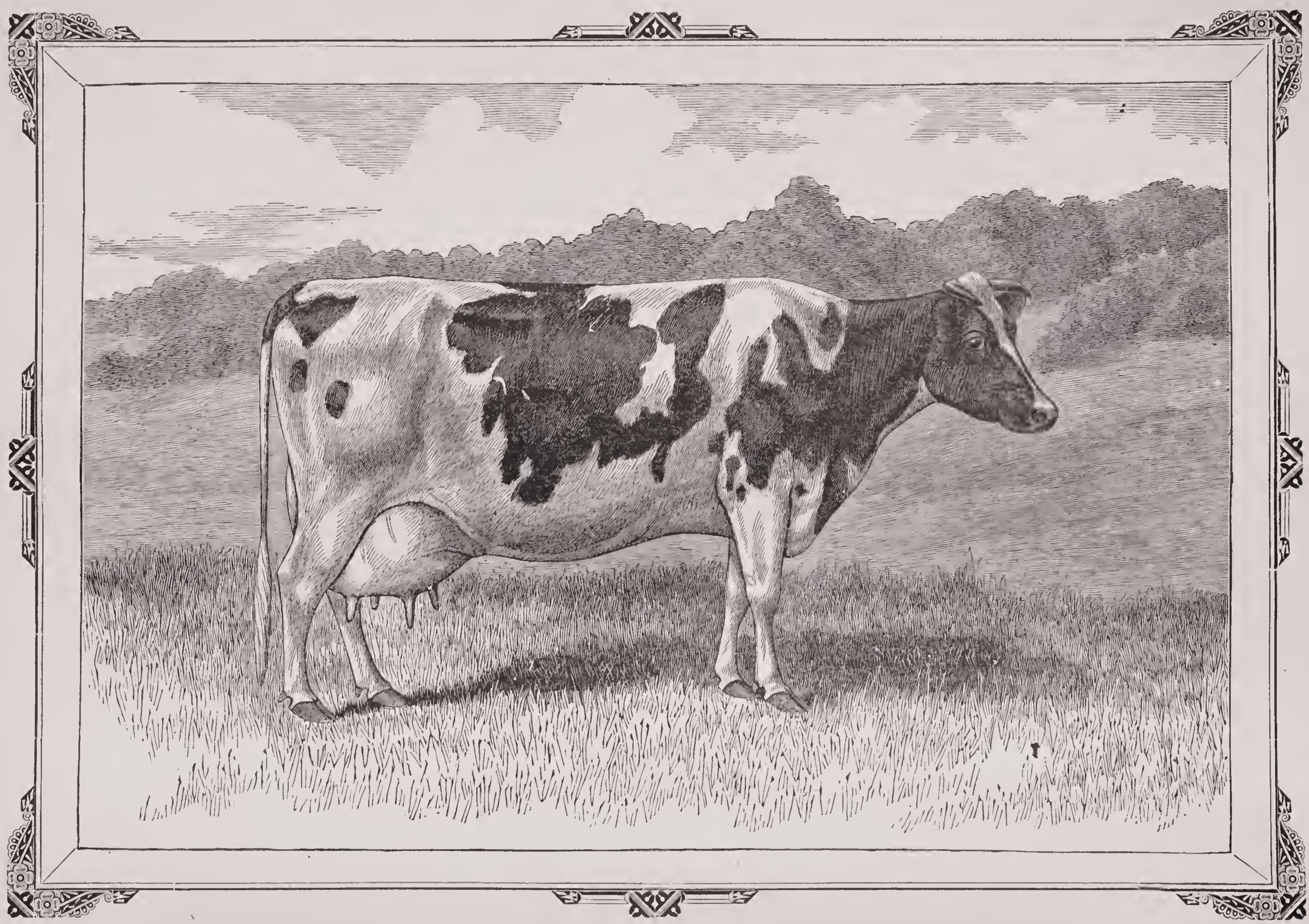


Fig. 8.—HOLSTEIN COW.

comes weak, languid, and often exhausted from the slightest exertion.

Treatment. The same treatment in the early stage is enjoined as in inflammatory Pneumonia, which the reader will consult, counter-irritation and purgatives. Bleeding should never be resorted to. When effusion takes place, it is necessary to puncture the sides with a trocar, and draw away the fluid, giving internally one of the following purges three times a day: rosin, 8 ounces, saltpeter 2 ounces; mix and divide into eight powders. Half-drachm doses of the iodide of potash, dissolved in water and given three times a day, are good.

PLEURO-PNEUMONIA. This disease, which has lately excited so much attention in the United States from its violent outbreaks in the Atlantic States, and the well grounded fear that for the lack of national legislation it might overrun the whole country, is the most malignant with which the farmers of the country have had to deal. Once fairly established in the West, there will be no possible means of eradicating it. It will remain a fixture forever.

Unfortunately veterinary science has never yet discovered a remedy. Its attack is so insidious, and often occupies so long a time in the stage of incubation, that a whole herd may be infected almost before it is known. As in the case of all German plagues, nothing is known of its origin; but just as soon as it is apparent that a case is being well developed, the only safe plan is prompt killing, deep burying of the carcass, skin and all, and the free use of quick-lime (a barrel to the carcass) before being covered up.

Definition. The definition of this disease is given as follows: It is a specific contagion peculiar to cattle, and manifested by a long period of incubation (ten days to three months), by a slow, insidious onset, a low type of fever, and by the occurrence of inflammation in the air-passages, lungs and their coverings, with an extensive exudation into the lungs and pleuræ.

That the infection is carried by the animals wherever they go is certain. That it is carried in the air to a very considerable extent seems altogether probable. That it is carried by inoculation is well demonstrated; and also by contact of diseased portions of an animal with the membranes of a well one, is as certain as that the contagion is carried by attendants on sick animals, and is proved almost beyond controversy. That the contagion will hold in stables for months, even after being thoroughly cleaned and washed with disinfectant liquids, is proved just as clearly as that it may be carried by the many. That it may be taken in pastures and with fodder is too well authenticated to leave room for doubt.

Vitality of the Virus. There is much difference of opinion with regard to the power of the virus to resist ordinary destructive influences. In many cases the free exposure of an infected place for three or four months to the action of the air has purified it so that fresh stock have been introduced with impunity. On the other hand, instances can be adduced in which cattle have been infected by being placed in stables in which cattle had not been kept at least four months previously. Other things being equal, it will be preserved longest where it has been dried up and covered from the free access of the air. Thus in very dry and close buildings, in those having rotten wood-work, or deep dust-filled cracks in the masonry, and in those with a closed space beneath a wooden floor, it clings with the greatest tenacity. Again, when the buildings contain piles of lumber, litter, hay, fodder, or clothing, the virus is covered up, secreted and preserved for a much longer time than if left quite empty. In these last it is preserved just as it is in woolen or other textile fabrics, and carried from place to place by human beings.

As carried through the air, the distance at which the virus retains its infecting properties varies much with varying conditions. When a sick herd was separated from a healthy one by not more than 15 yards and a moderately close board fence of seven feet high, and in the absence of all inter-communication of attendants, the exposed herd kept perfectly sound for six months in succession. On the other hand, infection will sometimes take place at a much greater distance without any known means of conveyance on solid objects. Roll quotes 50 to 100 feet, while others claim to have seen infection at a distance of 200 and 300 feet. But it may be well questioned whether in such cases the virus had not been dried up on light objects, like feathers, paper, straw or hay, which could be borne on the wind. This, from being in thicker layers, would escape the destruction that would have befallen it had it been carried in the air only as invisible particles.

How long a Diseased Animal is Infectious. Proof is wanting as to the infectious nature of the disease during the incubative stage. If negative evidence were of any value in a case like this, it would be easy to adduce cases in which the removal of an animal as soon as it showed symptoms of the plague had apparently saved the rest of the herd. In other cases the malady has been eradicated from a herd by careful watching and the prompt removal of every animal as soon as sickness appeared. The period of greatest virulence is that at which the fever runs highest, and when the lung is being loaded with the morbid exudation. The following rules should be observed when the disease is suspected:

1. Remove all litter, manure, feed and fodder from the stables; scrape the walls and floor; remove all rotten wood.

2. Take chloride of lime, ½ pound; crude carbolic acid, 4 ounces, and water 1 gallon; add freshly-burned quick-lime till thick enough to make a good whitewash; whitewash with this the walls, roof, floors, posts, mangers, drains and other fixtures in the cow stables.

3. Wash so as to thoroughly cleanse all pails, buckets, stools, forks, shovels, brooms and other movable articles used in the buildings; then wet them all over with a solution of carbolic acid ½ pound, water 1 gallon.

4. When the empty building has been cleansed and disinfected as above, close the doors and windows, place in the center of the building a metallic dish holding 1 pound flowers of sulphur; set fire to this and let the cow shed stand closed until filled with fumes for at least two hours. The above should suffice for a close stable capable of holding 12 cows. For larger or very open buildings, more will be required.

5. The manure from a stable where sick cattle have been kept, must be turned over and mixed with quicklime, two bushels to every load, then hauled by horses to fields to which no cattle have access, and at once plowed under by horses.

6. The pits, where the manure has been, must be cleansed and washed with disinfectant fluid ordered for the building.

7. The surviving herd should be shut up in a close building for half an hour, once or twice a day, and made to breathe the fumes of burning sulphur. Close the doors and windows, place a piece of paper on a clean shovel, lay a few pinches of flowers of sulphur upon it, and set it on fire, adding more sulphur, pinch by pinch, as long as the cattle can stand it without coughing. Continue for a month.

8. Give 2 drachms powdered copperas daily to each cow in meal or grains, or, divide 1 pound copperas into 50 powders, and give one daily to each adult animal.

9. Do not use for the surviving cattle any feed, fodder or litter that has been in the same stables with the sick. They may safely be used for horses and sheep.

Symptoms. The symptom most easily known in the early stage is an increased temperature of the body. If a clinical thermometer be introduced into the rectum of a beast in an infected district, and an abnormal heat is ascertained, it is safe to suspect the disease; therefore send for a veterinarian at once. Next, a slight cough will show itself; the hair will be erected along the back; there may be shivering and always tenderness of the back when pinched; the breathing and pulse is accelerated; the bowels are costive; rumination is irregular; the urine is scanty and high-colored, the appetite fails, the milk-flow is diminished, the nose will be alternately moist and dry. The horns and other extremities will be alternately hot and cold. In the field, the sick animals will separate from the herd. All the symptoms become more and more apparent until the animal remains in a fixed posture, the head rigidly extended, the mouth open, at every inspiration a moan, until at length the animal succumbs, a loathsome and noxious mass of cantagion.

Treatment. A resort to remedies should not be had unless the animals are taken early in hand, and can be isolated in a building far from any herd. It will not pay except in the case of thorough-bred or otherwise valuable stock. This is especially the case in the West, if that section should be unfortunate enough to import the disease. Prof. Gamgee, who made an elaborate report for the Government in 1871, strongly and wisely condemns purgatives and bleeding, but believes the disease may be checked, if taken in time, by isolating the whole herd, and depending on active internal astringents. He advises daily doses of sulphate of iron, ½ to 1 drachm to the bullock, mixed with an equal weight of linseed and coriander seeds, given in bran to disguise it; this he has found to mitigate the cough, followed by the disappearance of the disease.

In the second stage of the disease, he advises light but nutritious food, copious warm-water injections, and the following stimulant: ½ ounce carbonate of ammonia, 1 quart linseed oil; mix and give this dose 2 or 3 times a day. When only one lung is involved, recovery occasionally takes place; when both are involved, there is little or no hope. For cough and debility during convalescence, he advises the following tonic; ¼ ounce oxide of magnesia, ½ ounce iron filings, fine, 1½ ounce tincture gentian, 1 pint water; to be given daily. Another prescription is recommended: 1 drachm carbolic acid, 1 pint water; to be given as a dose three times a day. The reader will see upon a careful study of the foregoing, that but one prescription, killing, is the only safe plan.

PNEUMONIA. There are two conditions of the lungs known as pneumonia: one the inflammatory, and the other the congestive stage. The former may follow an attack of bronchitis, or it may have a spontaneous origin. The congestive is generally the result of cold suddenly applied to an overheated animal, causing a determination of blood to the lungs, which sometimes causes death by suffocation.

Symptoms. The disease is preceded by a shivering fit; dry skin; staring coat; clammy mouth; short cough; Schneiderian membrane of the nose very much reddened; respiration hurried or laborious. In the congestive stage, upon applying the ear to the sides no sounds will be detected, while in the inflammatory stage a crackling or crepitating sound will be distinctly heard.

Treatment. In the congestive stage, plenty of pure air will be necessary. Bleed freely, and give in drench 1 pound of Glauber salts, with 2 drachms Jamaica ginger. Nothing more will be required by way of treatment. In the inflammatory stage, bleeding should seldom be resorted to, except where the animal is in fine condition. Apply the following blister to the sides, well rubbed in: oil of turpentine, 1 ounce; Croton-oil, 12 drops; aqua ammonia, ½ an ounce; linseed oil, 4 ounces; mix all together. Give internally 1 pound of salts in drench, and follow with one of the following powders every 4 hours: nitrate of potash, 1 ounce; tartrate of antimony and pulverized digitalis leaves, of each 1 drachm; mix all together and divide into 8 powders. Or the following may be given, with equal advantage: nitrate of potash, 1½ ounces; nitrate of soda, 6 ounces; mix and divide into 6 powders, 1 to be given in wash or gruel every 6 hours.

RABIES, OR HYDROPHOBIA, in cattle, is the result of the bite of a rabid dog, from which bite no animal escapes. The effects produced by the wound made by the teeth of such an animal, after the virus is once absorbed into the circulation of the blood, are so

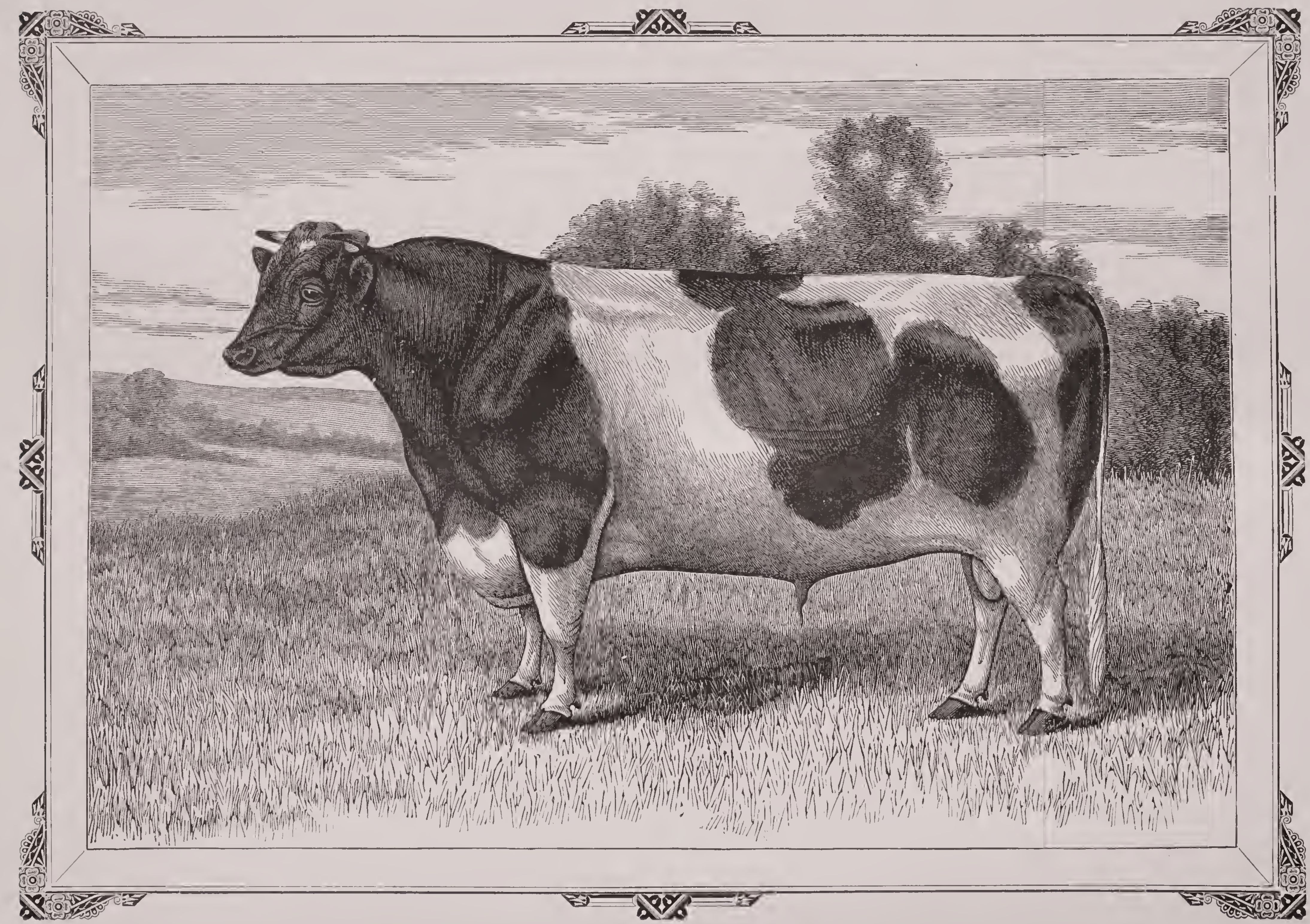


Fig. 9.—HOLSTEIN BULL.

poisonous that all treatment is absolutely useless. *Symptoms.* The animal separates itself from the rest of the herd, standing in a kind of stupor. with the eyes half closed; respiration natural; the slightest noise agitates, causing the eyes to glare and exciting bellowing; the bark of a dog produces the most violent effects; the animal foams at the mouth and staggers as it walks; if water is offered, the muzzle is plunged into it, but the victim cannot drink; in making the effort, the most fearful consequences are produced. The animal now seeks to do mischief, and the quicker it is then destroyed the better.

Treatment. This must be applied quickly, or not at all. The moment an animal is bitten, that moment the wound should be searched for, and when found, should be freely opened with a knife, lunar caustic, caustic potash, or the permanganate of potash at once applied to all parts of the wound, care being taken not to suffer a single scratch to escape. This, if attended to in time, will save the animal.

RED OR BLACK WATER, as it is called, is not a disease, but a symptom of other disease. The color of the urine varies according to the intensity of the disease, and the particular organ affected; hence should not be treated as a disease, but the cause carefully sought out and treated.

SIMPLE FEVER. This is increased arterial action with or without any local affection; it may also arise from sympathy of the system with the diseased condition of some particular part. The former is pure or idiopathic fever; the latter is symptomatic. Pure fever often occurs in cattle.

Symptoms. Dry muzzle; slow rumination; quickened respiration; the horn hot at the root, and frequently cold at the other extremity; constipation; coat bristling, and the cow usually seen separated from the rest of the herd. Where the attack is slight, a purge of salts, sulphur and ginger will be sufficient. If neglected or improperly treated, it may turn into pleurisy or inflammation of the lungs or bowels. In the latter case, an experienced veterinary surgeon should be called. Symptomatic fever is generally the result of an injury, the neighboring parts sympathizing with the injured part. The symptoms are similar to those given above. Unless promptly relieved, the animal dies. The treatment must begin with purging. Salts are the surest and safest remedy. A pound to a pound and a half with ginger and sulphur is a dose, dissolved in thin gruel. If this does not operate in twelve hours, give half the dose, and repeat once in twelve hours until the bowels are freed. The animal is relieved after the operation. Then sedatives, such as bloodroot, 1 drachm; powdered nitre, 2 drachms: this should be given two or three times in thin gruel.

SPLENIC FEVER: see Texas Fever.

STRANGULATION OF THE INTESTINES. This disease in cattle, popularly styled Knot, or Gut-Tie, in consequence of the peculiar arrangement of the abdominal viscera, is of very rare occurrence. When, however, it does occur, the symptoms accompanying are those of inflammation of the intestines. No kind of treatment will be successful, and the poor brute must suffer until death comes to its relief.

TEXAS FEVER. This disease, now called Splenic Fever, resembles in some of its phases the rinderpest of Asiatic Russia, but it is far less malignant and less contagious. It also disappears with the frost, being effectually stamped out during the winter, not to be again seen until re-introduced by the passage of Texas cattle. So, again, it is not given by our Northern cattle to other beasts. The disease has its home on the coast of Texas, but how it originated is not clearly known. After death the spleen is found greatly enlarged and softened, the kidneys broken, dung and blood fluid.

Symptoms. The period of incubation extends over four or five weeks after the poison has been introduced. The fever will at first be moderate, the temperature, as shown by a clinical thermometer introduced into the rectum, will be 103° to 107°. Then follows dullness, cough, trembling, jerking of the muscles, dropping of the head, arching of the back. The horns are hot, rumination ceases, and the appetite not good. The eyes become glassy and watery, the urine deep red or black from the blood contained, the dung is hard and coated with blood; the mouth and rectum will be a dark red or copper color; and the animal dies in a stupor or convulsions.

Treatment. Put the animal in a roomy stable with good ventilation, and give soft food. As an internal remedy give ½ ounce chlorate of potash, 1 ounce tincture of chloride of iron, 1 quart water. Mix and give as a dose, to be followed two or three times a day. The most dangerous symptoms being passed, give plentiful food and the following tonic: ½ ounce sulphate of iron, 1 ounce tincture of ginger, 1 quart water. This amount twice daily. Professor Gamgee does not regard medical treatment as being hopeful. In addition he advises that the limbs be well rubbed, and the bowels moved by injections. During the first two or three days he recommends ounce doses of laudanum, and later as a stimulant the following: ½ ounce sulphuric ether, 4 ounces of acetate of ammonia. Give in a quart of linseed tea three times a day.

THRUSH IN THE MOUTH. Aphthæ, or thrush in the mouth, is a vesicular disease of the mouth, sometimes occurring as an epizootic. It is often mistaken for blain, inflammation of the tongue, or black tongue, and usually occurs in the winter, or early in the spring. It appears in the form of vesicles or pustules all over the mouth, occasionally extending to the outside of the lips. These pustules break, discharging a thin sanious fluid, leaving minute ulcers in their places. This disease yields readily to treatment. 3 ounces Epsom salts, once a day for three or four days, should be given in drench; wash the mouth well with a solution of alum, tincture of myrrh, or vinegar and honey, and it will disappear in a few days.

TREMBLES, OR MILK SICKNESS. Dreadful disease, prevalent in uncleared, heavily timbered Western regions, caused by eating the white snakeroot (Eupatorium ageratoides), a plant of the boneset genus. This peculiar disease disappears from the region as it becomes cleared, cultivated and seeded down with the natural grasses. Where it exists the cattle should be sheltered at night. Their food should not be left exposed on the ground, as the action of the dew renders it deadly to young cattle if fed to them in the morning. Symptoms, spasms, trembling, convulsions, quick pulse, coated and swollen tongue, high-colored urine, fetid breath and constipation. In the last case, 1 drachm each powdered ginger and golden seal to 10 ounces of Glauber salts, in 1 quart of warm water, may be given. If the breath be fetid, give, three or four times a day, a wineglassful of a mixture composed of 4 ounces glycerine, 2 ounces of pyroligneous acid and 1 quart of water. The trembling, where curable, may be relieved by administering 2 drachms of tincture of Indian hemp in a little water, twice daily, or 1 ounce of laudanum and 4 drachms of tincture of assafœtida.

Typhoid Fever is generally considered the second stage of intense inflammatory action. Diarrhœa usually accompanies this kind of fever. The cause is not determined. Abundance of oatmeal gruel with tincture of cayenne, ½ ounce golden seal, bran diet, warmth to the body and pure air are essential in the treatment of this disease. Nature should be helped to regulate the animal system by rousing the digestive organs to their natural action, by light food, or, if necessary, a mild purgative followed by light stimulants. Epsom salts, linseed oil and sulphur are the chief purgatives.

Bull, Cow, Ox and Calves are treated under their respective heads.

Cattle, The Law as to Sales of. If a seller makes a willful mis-statement as to the condition of the property, or sells it as other than he knows it to be, or conceals a defect which the buyer could not by examination ascertain, it becomes a case of fraud, and the seller is liable to an action for damages. Concealment of the fact that a bull sold was impotent, or that a cow had ceased to breed, would be a fraud unless they were sold to a butcher, as every animal of that character is assumed to be fit for the ordinary purpose of of its existence. An affirmation in the bill of sale that a bull was a good and sure breeder would be a complete express warranty that he was such; and if the seller at the time he sells makes such a statement verbally, it is a warranty; and if the bull proves on trial to be impotent, the purchaser can in either case recover back the price paid for him, and any damages he has sustained. A statement made by a seller of a cow "that she was all right," was decided to be enough to let the case go to the jury for them to say whether it amounted to a warranty or not, and they said it did; and the cow being proved to be unsound, damages were awarded against the seller. An animal is sound which is free from hereditary disease, is in possession of its natural and constitutional health, and has such bodily perfection as is consistent with its natural formation. It is free from vice when it has no bad habits that make it dangerous, or that are injurious to its health, or that in any way diminish its natural usefulness. A cow under this definition could not be considered sound which had aborted more than once, or had failed to be with calf after several services, or milked from only three teats; nor a bull which had become impotent, or, from too free use when young, failed to serve in two cases out of three. A kicking cow is vicious, as well as one that runs at and attempts to hook any one with her horns.

Cattle, happily, are not subject to the many diseases which render horses unsound, but such complaints as chronic asthma, cough which may degenerate into bronchitis, catarrhal fever, thick wind and broken wind, they are likely to have occasionally; and these are breaches of warranty of soundness. Lameness, whether temporary or permanent, is an unsoundness in a horse and would be in cattle. So is diseased liver, as well as all diseases of the lungs. A mangy animal is unsound, or one liable to paralysis or rheumatism. And any complaint or accident which has in any way impaired, or is likely to impair, the quality or usefulness of the bull, cow, ox or calf, is an unsoundness. A description, in a bill of sale of an animal, of its pedigree would constitute a warranty that it was of the breeding so represented.

When sales are made at public auction or privately by printed terms of sale and catalogues, these form part of the contract and will be binding upon the parties. If between the publication of these terms and the sale any accident occurs to the animal, or if a cow aborts or calves, notice should be given of the fact, or the purchaser may, on discovering the change, repudiate the bargain and recover the price he paid or damages, and in certain cases both. In taking a warranty it is safer to have everything expressed, such as the pedigree, age, freedom from vice, and soundness, which the buyer desires to be assured of; and let the affirmations be positive. A bill of sale of "a horse four years old, constantly driven and used in a plow; warranted," was held to be a warranty of soundness only, and a bill of sale of a horse in which he was stated as "considered sound" was held not to be a warranty of soundness. As soon as the purchaser discovers that there has been a breach of warranty he should give notice, offer to return the animal, and demand his money back, if he desires to be reinstated in the position he occupied before the sale.

In sales at auction the secret employment of "puffers," or fictitious bidders to enhance the price unduly, is a fraud on the purchaser, who would avoid such a sale. The owner of an animal sold at auction has no right under the usual conditions of a sale—that the highest bidder shall be the purchaser—to employ any person to bid on him for the purpose of enhancing the price. It is just as true in horse and cattle dealing as in other business, that constant and permanent success depends on character as well for honesty as for judgment. A man sells a bad animal for advan-

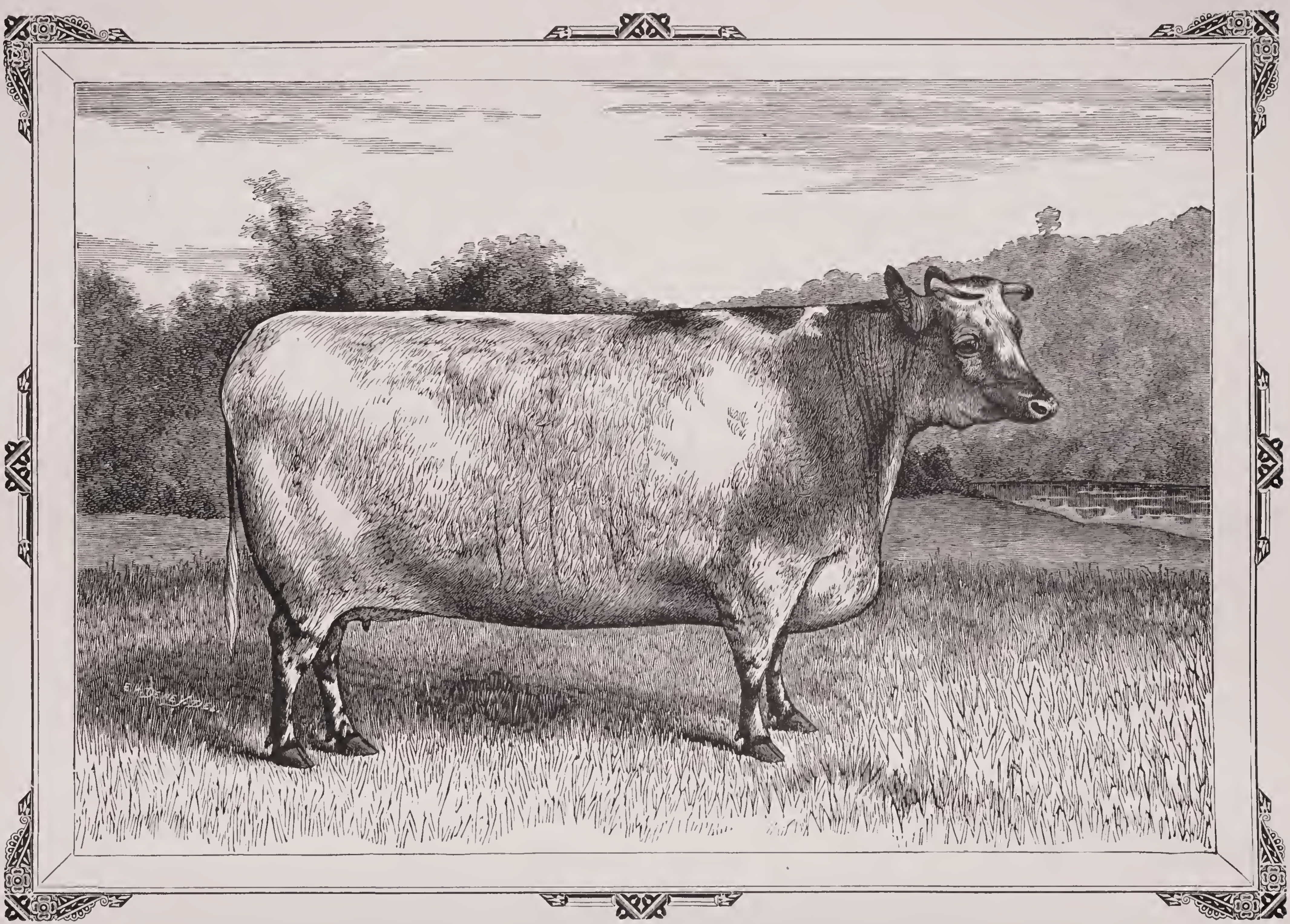


Fig. 11.—A FATTED SHORT-HORN COW.

tage; but he knows that if chargeable with an intention to deceive he is at once classed with the knave in the business.

The best way to sell a horse, bull or cow which you want to get rid of is to tell the truth about it. A frank acknowledgment of faults will often obtain credit for a counter statement of good qualities. Let the fault of an animal be what it may, it will suit some purpose, and will find a purchaser at its fair value. Many persons will buy an imperfect animal at a reasonable price, taking the risk of curing and getting a good bargain.

Caul, or **Omentum**, the membrane covering the lower intestine. "Caul fat" is that which grows upon this membrane.

Cauliflower, a garden vegetable of the cabbage family. In cultivation pursue the same course as with cabbage; manuring rather heavier and hoeing oftener. It wants the cool, moist weather of the fall months to perfect itself. It is prepared and eaten as cabbage.

VARIETIES. *Early Paris.* A standard.

Extra Early Dwarf Erfurt. One of the best cauliflowers.

Fitch's Early London. The best strain of this standard English sort.

Nonpareil. One of the earliest varieties; resembles Early Paris.

Lenormand's Short-Stemmed Mammoth. Dwarf, large and fine; one of the largest and most reliable for general cultivation.

Italian Early Giant. Fine, large, white-headed and early.

Carter's Dwarf Mammoth. A premium English variety; very early, with heads remarkably large for such a dwarf.

Large White French, *Dwarf Early Le Maitre* and *Stadtholder* are other good varieties; and *Gerry Island*, *Berlin Dwarf*, *Late Algerian* and *Henderson's Early Snowball* are new varieties which promise to supersede some of the old.

CAULIFLOWER, TO COOK. Cut the stalk close and trim the leaves from a nice white cauliflower. Lay it in cold salt water for one hour, then tie in a piece of thin muslin and put it, flower downward, into equal parts of milk and water, with a little salt. Cook only until tender, which will be in about 20 minutes, more or less, according to size. When done, place on a hot dish, flower side up, and pour over it sauce.

Caustic, burning; said of a drug which burns or corrodes flesh or vegetable tissue. Potash and silver nitrate are the most prominent examples. "Lunar caustic" is silver nitrate in sticks, convenient for certain purposes. For ordinary cases, a solution of silver nitrate, ten grains to an ounce of water, is the most in vogue.

Cauterize, to burn or sear with a hot iron or caustic drug, as morbid flesh.

Cautery, a burning or searing, as of morbid flesh, by a hot iron, or by caustic drugs which burn, corrode, or destroy any solid part of an animal body. Burning by a hot iron is called "actual" cautery, and that by a drug, "potential" cautery.

Cavity, of an apple, is the hollow around the insertion of the stem.

Cayuga, a breed of ducks: see Ducks.

Cedar: see Forestry, Landscape Gardening, etc.

Celery. This is a garden salad of the parsnip order, but the stems only are eaten, they being blanched (whitened) by covering with earth during cultivation. There are two methods of culture.

1. Sow the seed early in a hot-bed. When three inches high, transplant to a bed in the garden, about four inches apart, and cover them frosty nights. When about eight inches high, remove the suckers, strip the leaves and transplant to a previously prepared trench, 18 inches deep, three-fourths filled with well rotted manure and muck, thoroughly mixed. The trenches should be five or six feet apart, and the plants should be set about ten inches apart in the row, with the earth carefully packed about the roots. Instead of the first transplanting, many transfer them at that age directly from the hot-bed to the open trench. The object of the trench is to allow hilling up (Fig. 1) toward fall for the purpose of blanching. In that situation the plants also have a more even temperature. A three-inch tile running along under the plants affords a good method of applying salt water and liquid manure. The tile and trench should pitch a little, so as not to hold standing water; for while the celery should be kept moist, it should also be kept drained. This tile supply is easily controlled, as there is a hopper tube at the upper end and a gate at the lower.

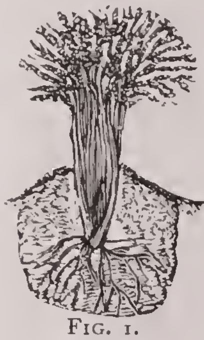


FIG. 1.

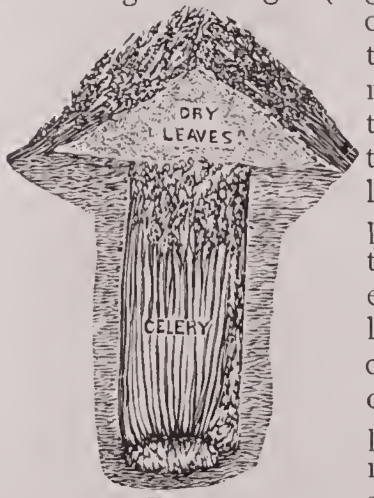


FIG. 2.

To blanch celery (that is, whiten the leaf-stems), draw the earth up around it from time to time, taking care not to cover the center shoots. This process is continued until in October, by which time the plants are covered to their tips, and just before the ground freezes they are ready to be covered with dry leaves and evergreen boughs (Fig. 2) for wintering. But another process of wintering is to take them up with as much earth as possible attached to their roots, and set them in rows close together, leaving only space enough to prevent the plants from touching, and packing the earth firmly around them, leaving only an inch or two of the tops sticking out; then covering either with boards, placed so that the water cannot penetrate, or with cornstalks thickly bent over and fastened. Drains should be dug around the celery to carry off the water. It may be kept in this way until May and well blanched. It is well known that stalks of celery stood in spring water under a shed, where it is not likely to be frozen, will become white and tender. But it is only a few persons who can have the spring water at hand for this use. Celery can be perfectly blanched and preserved by packing the roots in wet earth and keeping them in a cellar. Large boxes are obtained and a few inches thick of earth placed on the bottom and made as wet as possible. The plants are then packed upright, side by side as close as they can stand, until the boxes are full. The upper leaves are of course exposed, and attempt to grow a little by the encouragement given to the roots by the wet earth causing growth enough to blanch the whole.

2. The other method of raising celery differs from the foregoing only in transplanting to level ground instead of trenches. It requires less labor, but also correspondingly less good celery. If planted in July, nothing is to be done but to keep the ground clear of weeds until September; by that time the handling is to be begun, which consists in drawing the earth to each side of the celery, and pressing it tightly to it, so as to give the leaves an upward growth preparatory to blanching for use.

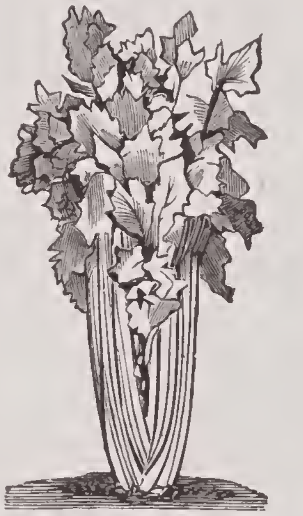


Fig. 3.—*Boston Market Celery.*

Varieties. *White Solid.* A standard sort.

Carter's Crimson. Dwarf, solid and crisp; a first-class variety.

Sandringham Dwarf White. Most dwarf of all; very solid; white.

Turnip-Rooted. The root of this is eaten; also called celeriac; does not need to be earthed up.

Turner's Incomparable Dwarf. White, solid. In dwarf habit next to the Sandringham.

Boston Market. Short, compact and solid; very popular.

Crawford's Half Dwarf. A new variety with a rich, nutty flavor and great vigor of growth.

To Prepare Celery for the Table, cut off all the little roots, and shave off all the external dark covering of the bulb of the root; slice the root transversely in sections of one-fourth or one-eighth inch thick; remove the outer stalks; cut another section from the root close up to the attachment of the next row of stalks; remove the stalks by pulling gently sideways, and it will separate at the joint; cut the center piece into two or three pieces, or not, as you choose; put all in a pail of cold water; use a brush to clean each piece, using plenty of water; cut off the largest stalks just above the two lower leaves; place the long stalks outside in the celery dish, the center piece in the middle, and finish out with sections of roots, etc; then fill the dish with water and send to the table.

Another method: Wash the roots free from dirt, and cut off all the decayed leaves; preserve as much of the stalk as you can, removing any specks or discolored parts. Divide it lengthwise into quarters, curl the top leaves, and place it with the roots downward in the celery glass nearly filled with cold water.

Cellar: see Residence and Hygiene.

Cement. No cement is of any value unless, in its preparation, all dirt is excluded. The receipts given below will be found to answer every reasonable demand, if properly prepared.

For Cisterns. Take equal parts of quick-lime, pulverized baked brick and wood ashes. Thoroughly mix the above substances and dilute with sufficient olive oil to form a manageable paste. It immediately hardens in the air and never cracks beneath the water.

Another: Take 1 part ordinary brick dust, made from hard-burned and finely pulverized bricks; 1 part of lime and 2 parts of sand; mix together, dry, and temper with water in the usual way.

For Glass and China Ware. Take white (fish) glue, 1 pound 10 ounces; dry white lead, 6 ounces; soft water, 3 pints; alcohol, 1 pint. Dissolve the glue by putting it into a tin kettle, or dish, containing the water, and set this dish into a kettle of water to prevent the glue from being burned; when the glue is all dissolved, put in the lead and stir and boil until all is thoroughly mixed; remove from the fire, and when cool enough to bottle, add the alcohol, and bottle while it is yet warm, keeping it corked.

Another: Two measures of litharge, and 1 each of unslacked lime and flint glass; each to be pulverized separately before mixing; then to use it, wet it up with old drying-oil. Water hardens it instead of softening.

Another: Sifted air-slacked lime, mixed with white of an egg. Or boil 1 ounce of glue with 1 gill of milk, or in that proportion, and it will resist the action of water when used.

For Furniture and Wooden Ware. To mend marble, wood, glass, china and ornamental ware, take water, 1 gallon; nice glue, 3 pounds; white lead, 4 ounces; whisky, 3 quarts. Mix by dissolving the glue in the water; remove from the fire and stir in the white lead, then add the whisky, which keeps it fluid, except in the coldest weather. Warm and stir up when applied. Or, powdered chalk and common glue.

For Iron and Stone. Glycerine and litharge, mixed into a paste, furnish an extremely firm cement for iron and stone. The material hardens very quickly and must therefore be used at once. It is insoluble in water, and attacked only by concentrated acids. Articles joined with it can be used in a very few hours afterwards. Sandstone blocks joined by this cement, have broken a fresh fracture, rather than at the point

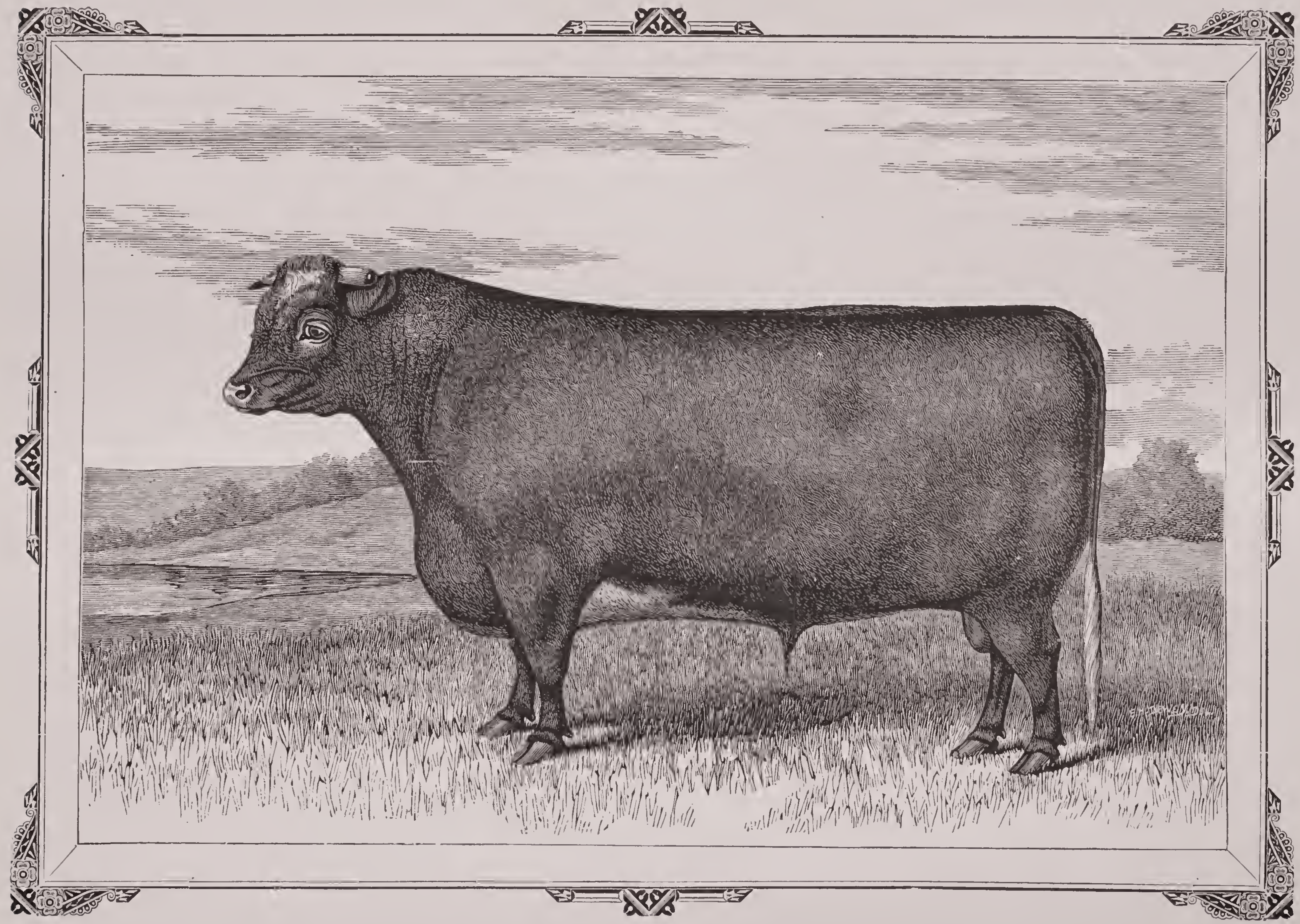


Fig. 12.—SHORT-HORN BULL.

of the union of the original surfaces. Very dry litharge does not form so good a cement as that which has absorbed a considerable amount of water. Only the purest material is to be used.

FOR STEAM AND HOT-WATER PIPES. White lead paint, with over half as much iron borings.

FOR STOVES, FLUES, ETC. Common wood ashes and salt, made into a paste, with a little water. With this mixture, an aperture through which the fire or smoke penetrates may be closed in a moment. Its effect is equally certain, whether the stove is hot or cold. Or, iron borings or filings, with salt water and a very little sal ammoniac.

FOR CHIMNEYS, *outside*. 3 parts ashes, 3 parts clay, and 1 of sand: said to make a cement as hard as marble, and impervious to water.

FOR MENDING RUBBER. Cut virgin or native India rubber with a wet knife into the thinnest possible slices, and with the shears divide these into threads as fine as fine yarn. Put a small quantity of the shreds (say one-tenth or less of the capacity of the bottle) into a wide-mouthed bottle, and fill it three-quarters full of benzine of good quality, perfectly free from oil. The rubber will swell up almost immediately, and in a few days, especially if often shaken, assumes the consistency of honey. If it inclines to remain in undissolved masses more benzine must be added; but if too thin and watery, it needs more rubber. A piece of solid rubber the size of a walnut will make a pint of the cement. This cement dries in a few minutes.

FOR CANNING FRUITS. Resin, 1 pound; lard, tallow and beeswax, of each 1 ounce. Melt and stir together; and have it hot, ready to dip into when canning.

Center of Gravity, that point in a body or mass of matter around which all parts exactly balance each other.

Cereal, grain from which breadstuff is made; also, of or pertaining to such grain. For a few years past there has been great rivalry in the preparation of wheat, oats, barley and corn in various forms for puddings, mushes, cakes, gruels, blanc mange, bread, etc., each party branding his article with some fancy name, as "Snowflake Corn," "Prepared Wheat," "Cereal White," "Pearl Hominy," etc., all of which articles are good enough when fresh. Steam-cooked oats are the most convenient for a hasty dish, as it will sufficiently swell up, in boiling water, in five to ten minutes.

Cerebro-Spinal Meningitis (ser′-e-bro spi′-nal men-in-ji′-tis), spotted Fever; which see.

Cess-Pool. Any pool or mud-hole which becomes foul by the reception of the sediment of drains, etc. Such a thing is unsightly and unhealthful, and no farmer should permit such a thing upon his premises.

Chaff, the seed husks of the smaller grains and of grasses. Valuable for mulching, covering vegetables and fruits to keep over winter, conservatories, etc.

Chafing, irritation of the skin. It generally affects stout and fleshy persons, especially in warm weather. Alum dissolved in water and applied with a clean linen rag, is an excellent remedy. Flour or corn-starch is also very good.

Chafing Dish. A dish or vessel to hold coals for heating anything set on it; a portable grate for coals.

Chairs, like shoes, are nearly all made wrong, for either comfort or health. They are so made as to force an inconvenient and unphysiological curving of the spine; and rockers and "easy chairs" have their backs at the top turning from the head, instead of projecting forward a little, to support the head. Solid-wood-bottom chairs, or "Windsor" chairs, as they are sometimes called, in the winter time are often too cold for use. Sitting in them tends to bring on pains in the back and loins, neuralgia, and various other ailments in the region of the hips.

Challenge, in hunting, is the opening and crying of hounds at first finding the scent of their game.

Chamomile, or camomile (cam′ o-mile), a pleasantly scented fennel, used in sweating medicines. The herb is easily raised in the gardens of this country.

Champagne, (sham-pane′), a kind of brisk, sparkling wine. The name is also given to many imitations of that popular beverage. One imitation is made by mixing tartaric acid 1 ounce, 1 good-sized lemon, ginger root 1 ounce, sugar 1½ pounds, water 2½ gallons, and yeast 1 gill.

Another: Raisins 7 pounds; loaf sugar 21 pounds; water 9 gallons; tartaric acid 1 ounce; honey ½ pound; ferment with sweet yeast 1 pound or less; skim frequently, and after fermentation is nearly over, add coarse powdered orris root, 1 drachm, and orange-flower water, 3 ounces; lemon juice ¼ pint. Rack it, and in three months fine it down with isinglass ½ ounce; in two weeks bottle it, putting into each bottle a piece of double-refined sugar the size of a pea.

CHAMPAGNE, SUMMER. To 4 parts of Seltzer water add 1 of Moselle wine (or hock), and put a teaspoonful of powdered sugar into a wineglassful of this mixture; an ebullition takes place, and you have a sort of champagne which is more wholesome in hot weather than the genuine wine known by that name.

Chapping, cracking of the skin, by exposure to dry or cold winds. To keep the hands from chapping, see that they are perfectly dry before they are exposed to cold air. Taking off the mittens or gloves out-doors on a cold day exposes the hands to chapping; then apply a little honey, glycerine or raw linseed oil; rub it well into the cuticle.

If nothing is done to prevent, and the person is obliged to have his hands frequently wet and dried, the cracks will often get deep and be painful. Corn-husking, particularly, is the cause of sore hands in this way.

As both a precaution and a cure for chapped hands, wash the hands (and the face also, if it is inclined to chap), with borax water, and afterward rub with an ointment made by melting mutton tallow (or suet), and then gradually adding an equal quantity of glycerine, stirring the two together until cool. For the hands, this mixture can be best applied at night, using it freely and warming it in by the fire, after which an old pair of gloves can be put on to keep the bed clothes from being soiled, and also make the skin of the hands softer. An excellent glycerine ointment for chapped hands is made by melting, with a gentle heat, 2 ounces of sweet oil of almonds, ½ an ounce of spermaceti, and 1 drachm of white wax. When melted, remove from the stove and add gradually 1 ounce of glycerine, and stir until the mixture is cold. The ointment may be scented with any perfume to suit the fancy. Keep in wide-necked bottles. To keep the hands from getting sore during harvest, use camphor dissolved in alcohol. Rub it on the hands, morning, noon and night, directly after washing.

For chapped lips, some one of the preceding; or honey, cream and rose of lavender.

Charbon (shar′ bon), in farriery, is a small, black spot or mark remaining in the cavity of the corner tooth of a horse after the large spot or mark has become obliterated. The word is also a name of a disease of cattle and horses, known further by the names, "anthrax," "bloody murrain," "black quarter," "spotted fever," etc. See Bloody Murrain, page 200.

Charcoal, such portion of the woody fiber as has escaped complete combustion in burning vegetable matter. To make it in large quantities, cut the timber (oak, beech and maple are best) in the winter and let it stand until summer; then, if sufficiently dry, cut it into small billets; throw up the ground a little higher than the surrounding surface; beat it so as to form a hard, dry, solid floor; in the center of this area, place a circle of sticks, adjoining each other, and composing a vertical, hollow cylinder from three to four inches in diameter and about six feet high; around the cylinder are ranged successive circles formed by pieces from one to ten inches in diameter; several flues must be formed through the pile so that it will kindle in a short time and burn equally. The outermost circle is composed of brush-wood and chips. A coat of turf must now be laid on, the grass side to the wood; heap dry earth around the bottom of the pile and well ram it to prevent admission of air. Now kindle by dropping lighted chips down the hollow cylinder in the center, then close the top of the cylinder and pierce a row of holes at the base about two inches in diameter, by which the requisite quantity of air is supplied and a passage afforded for the smoke and vapor. When the white smoke is succeeded by thin blue and transparent smoke, the holes are all closed up and the pile is covered over with earth till the fire is completely extinguished. The fire is now allowed to cool, which requires many days. It remains long red-hot in the center, and if opened before perfectly cool, it will burn with fury. Charcoal burns away very quickly, requiring constant renewal, and is expensive; but it is the best fuel where a regular heat is required.

Animal Charcoal is made from the bones of animals, and is used to decolorize vinegar and other vegetable liquids, etc. To make it for this purpose, fill a crucible with the most compact parts of ox and sheep bones; lute the cover, leaving only a small opening at the top; place the crucible on a forge fire, and heat it gradually until red; when the flame from the oily and gelatinous parts has ceased, diminish the opening and suddenly raise the fire; when the charcoal has become cold, reduce it to fine powder.

As an Antiseptic, wood charcoal possesses extraordinary powers, in checking decomposition, as well as in deodorizing animal substances which have begun to decay. Meat, before or after it is cooked, may be preserved a considerable time, even in warm weather, by being placed in a clean vessel and surrounded with charcoal. Water is immediately deprived of its bad smell by charcoal.

Antiseptic Poultice of charcoal is made by taking linseed meal, ½ pound, charcoal powder, 2 ounces, and hot water sufficient to give it the necessary consistency. Besides purifying and healing, it counteracts the offensive smell arising from putrid sores.

Warning: Remember that in order to exercise its powers as a disinfectant, deodorizer and bleacher, it should be fresh burned and carefully preserved, out of contact with the air. Again, although it gives no smoke, its combustion can not go on without the formation of carbonic acid gas, which, being heavier than the atmosphere, generally occupies the lowest place in the apartment; yet a certain portion can not fail to mingle with the air and render it unwholesome to breathe. The air arising from the burning being clear and transparent we have no warning, as in coal. The first sensation, when it has become dangerous, is a slight sense of weakness, next, slight giddiness, then drowsiness; the subject falls on the floor insensible, and breathes strong as in apoplexy. *Remedy:* Cold water to the head and mustard or hartshorn to the soles of the feet. Give out-door air constantly and thoroughly, at any expense.

Charge, in farriery, is a sort of plaster or ointment.

Cheat, the name of a grass: see Chess.

Check, in commerce, is an order upon a bank to pay on demand to the person named in the check, or to his order, the sum of money specified in the body of the check, in writing. All such checks require a two-cent revenue stamp to be placed upon them.

Check Ease, same as Check Rein of the next paragraph.

Check Rein, the rein by which the horse's mouth is drawn back toward his throat, with the object of raising his head, and giving a graceful curve to the neck. See Bridle.

Check-Rower, a corn-planter which plants the corn in check-rows without a previous marking or furrowing of the field. The wire check-rower operates by a wire which is stretched across the field. See Corn-Planter.

Cheese. All the chief dairies in this country now make good, honest cheese, having waked up to the fact that they are in competition with England and the continent of Europe, and even with the independence of the public in the United States, who are ready to do without cheese altogether rather than use a poor article. The instructions here given are therefore not designed for extensive cheese-makers, but for farmers generally, and for beginners in the art. Where large quantities are to be made, it is generally advisable to take advantage of the facilities for production afforded by the factory, for the following reasons: Unless sufficient male help is at hand, the labor of cheese-making on a large scale is much too severe for the women of the household. The cheese made at the factory is more uniform in flavor and commands a better price than the home-made article. A larger amount of cheese can usually be made from a given quantity of milk at the factory than elsewhere. But to those who have either no desire or no opportunity to avail themselves of the services of the factory, the following observations and directions will be found valuable.

The various kinds of cheese are made in three ways: 1st. From the entire milk. 2d. From a mixture, one-half of which is new, the other half having stood from 10 to 12 hours, and from which the cream rising in that time has been removed. 3d. From milk which has parted with nearly all its cream. Of this last kind it is hardly necessary to speak: it is as unprofitable as it is unwholesome. The second kind is of tolerable flavor and moderately healthful. The first kind, when properly and carefully made, is rich and of fine flavor. For the making of cheese on a small scale, a cheese hoop about ten inches in diameter with a follower, a new wash-tub and a press are required. These articles are to be had cheap. A good press, however, can be made in a few hours from a 12-inch plank and a few pieces of scantling. One foot from either end of the plank set up two short pieces of scantling $4\frac{1}{2}$ inches apart. Fasten them firmly to a plank with bolts or pins. The lever may be a joist 4x4x6, and 14 feet long. One end is secured by uprights at one end of the plank. A weight hung at one end of the lever completes the press. The cheese is pressed by putting the hoop containing the curd near the end of the press-beam, which is fast, placing blocks on the follower and letting down the beam. The curd may be cut with a large bread knife or a long, thin, wooden one.

The milk having been taken to the house in a sweet and pure condition, perfectly free from dust and foul odors, it should be strained in the usual manner through a cloth into a cheese tub. One gallon of milk should yield one pound of cheese. The precise quantity used at a time should be noted. Part of the milk should be placed in kettles or larger pans containing a little water to enable the dairyman to increase the temperature of the milk without scorching it. Enough must be warmed to bring the whole, when in the tub, up to a temperature of 83°. The next operation is the curdling of the milk. This is done by adding rennet. It is procured from the fourth stomach of the calf, which should not be washed, but turned, carefully wiped with a cloth, sprinkled with pure salt, and dried at a moderate temperature in the open air. The Scotch put about two handfuls of salt into and outside the maw, or bag, roll it up and hang it near a fire to dry. It is said to improve by hanging a year or longer before being infused. When prepared for use it is steeped in either whey or brine. Whey is preferred by some; but it should be first boiled and strained. Some steep the rennets a week, during which time they should be squeezed and rubbed so as to extract the active principle. The Scotch method, which is highly spoken of, is to cut the rennet up into small pieces and put into a jar with a handful or two of salt. Soft water boiled and cooled to 65° is added. If the rennet is that of a new-dropped calf, three pints will suffice; if the calf has been fed four or five weeks, two quarts may be used. When the infusion has remained in the jar about three days, the liquid is strained and may be bottled for use. If a dram glass of any ardent spirit is put into each bottle, the infusion may be used immediately, or kept as long as convenient.

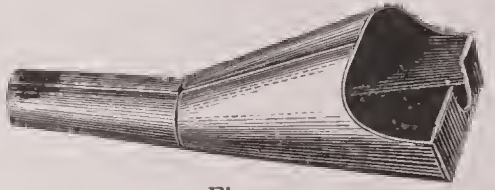


Fig. 1.

Fig. 1 represents a spout made for the purpose of conducting the milk from the weigh-can to the vats. The tube on the end can be extended any length, but if over two feet long should be an open trough.

Another method is to put ten rennets, properly prepared, into ten gallons of blood-warm water; churn or rub them often during 24 hours; then rub and press them to get the strength; stretch, salt and dry them as before. They will gain strength for a second use. Make the liquor as salt as it can be made, strain and settle it, separate it from the sediment, if there is any, and it is fit for use. Sometimes two ounces of common sage, two ounces of cinnamon, two ounces of cloves and six lemons are added to the liquor, to quicken its action and preserve its flavor. It should be kept cool in a stone jar, and it will keep sweet and of uniform strength. Stir before dipping off. The English method is to steep the rennets in brine strong enough to bear an egg. Six rennets, 1 sliced lemon, 1 ounce of saltpeter to 2 gallons of brine. The brine liquor is usually prepared one or two months before being used. It is believed that this age improves its coagulating qualities. Poor milk requires more rennet than rich. Too much injures the cheese; too little retards the work and makes the cheese sour and hard. It should be constantly borne in mind that milk is one of the most sensitive of all fluids to noxious influences. Therefore, the most scrupulous and constant cleanliness should be maintained in every step in cheese-making. All vessels used should be scalded with *boiling* water, *not simply with hot* water, as soon as they have been emptied of their contents. The pastures of the cattle, their food and drink, should be kept free from all putrefactions and from fermentations of whatever kind. Consequently, stagnant water and sour land, as well as moldy food, should be carefully avoided. In parts of England the contents of the calf's stomach are sometimes salted by themselves, and, after a short exposure to the air, are fit for use. In parts of Scotland the curds are left in the stomach, and both are dried together. It is generally held that rennet, as usually prepared, is not fit for use until about a year old. The following method of curing rennets, although it differs in some important particulars from what has just been said, is given, both on account of the extreme importance of the subject of rennet in cheese-making, and of the authority of the gentleman from whom it comes, who is employed by the Eastern Ontario Dairyman's Association in the making and curing of cheese:

First. A rennet that is taken from a calf that has never been suckled or fed is rank poison, and should never be saved. The calf should be at least three days old before killing. (2.) They are usually in their best condition when the calves are from five to ten days old, but they do not vary much in strength so long as the calves live entirely on milk. As soon as they begin to live upon solid food, the strength of their stomachs, as rennets, begin to abate. The stomachs of calves five days old are generally preferred by cheese-makers to those of older or younger.

To obtain the best rennets, the calf should be allowed to suck or to be fed a moderate meal twelve hours before killing. It is a good way to give the last meal at night, and kill the next morning. Fifteen hours is not too long, but in going too long without being fed the stomach becomes inflamed and congested with blood, giving it a dark reddish appearance, and the disturbed condition thus occasioned is carried with the steepings of the rennet into the cheese, and affects it very unfavorably. The calves should live till the curd from their last meal is nearly dissolved, and no longer. As the curd disappears the coagulating agent accumulates, not in the juices of the stomach, as might be supposed, but is deposited on the inside of the stomach, forming a delicate coating, faintly flesh color and very tender, which breaks off in thin flocculent scales upon slight friction.

As this coating contains the concentrated strength of the rennet, it is desirable to preserve as much of it as possible. To this end, the sack, when taken from the calf, should be handled with great care. The contents should be emptied out carefully, sack turned inside out, and any specks of dirt or hairs that may appear on it, picked off. If further cleaning is necessary, it may be carefully wiped with a moist cloth; *water* should never be used in cleaning. When sufficiently dried and lightly salted, it is ready for drying, which may be done in any convenient way, so that it shall not waste by dripping or injure by tainting. It may be stretched on a crutched limb, its ends may be tied and inflated, or it may be cut open and laid on a dried board, which will aid in drying by absorbing its moisture. These modes of preserving are very much better than salting in pickle or filling with salt.

If exposed to too much heat, rennets lose strength quickly; 120° F. heat will kill the strength entirely; therefore they should never be dried on plates or tins round the stove.

When annatto is used for coloring purposes, it is used at this stage of the operation. It is commonly dissolved in hot milk, the quantity used rarely being more than one ounce of annatto to one hundred pounds of the curd. It is a commodity largely adulterated, sometimes with lead or mercury, and its use might be advantageously discontinued.

The milk having been brought to a temperature of from 80° to 83°, enough rennet is stirred into it to produce coagulation (curding) in about 40 minutes. As soon as the curd is firm enough, which may be known by its breaking smoothly when the finger is passed through it, it is cut with curd knives into squares about ¼ to ½ inch in diameter. Some break the curd gently with the hands. It is then allowed to stand from ¼ to ½ an hour, when the whey is expelled and the curd becomes quite firm. Part of the whey is then dipped off and heated. The mass of curds is then gently lifted and broken into minute pieces; warm whey is added until the temperature is raised to 98°, the contents of the vat being gently stirred to prevent the packing of curds on the bottom. It is then allowed to stand about half an hour, and the operation is repeated until the curd is firm and easily falls to pieces when pressed in the hand.

The whey is then either dipped off, or drained away by a spout in the vat, down to the curd. One end of the vat is raised in order to facilitate the drainage. Or, use a whey strainer and siphon, Fig. 2, which is a great convenience.

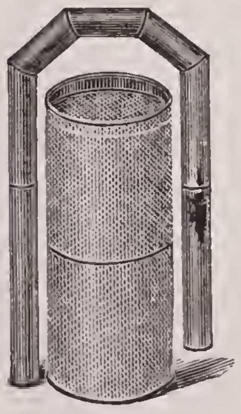


FIG. 2.—*Whey Strainer and Siphon.*

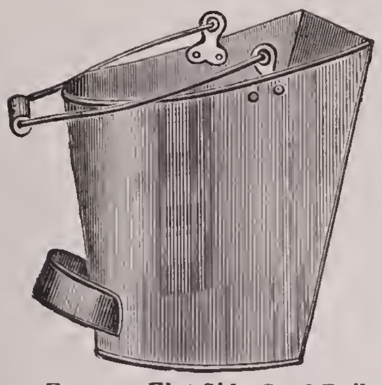


Fig. 3.—*Flat-Side Curd Pail.*

The curd is then put into the strainer on a basket or hopper, the bottom of which is made of slats. By some it is at once placed in the cooler, broken into flakes or cut up with curd knives. The metallic-head curd knives, perpendicular and horizontal, of tinned steel, Fig. 4, have no wood about them except the handles; hence there is no danger of the blades becoming loose from the shrinkage and swelling of the wood between the blades as in the old styles, nor can filth accumulate in the joints, as where wood is used. The blades of these knives are of steel, ground to a keen edge, and the metal is nicely tinned over to prevent rusting. They are the finest knives for the purpose.

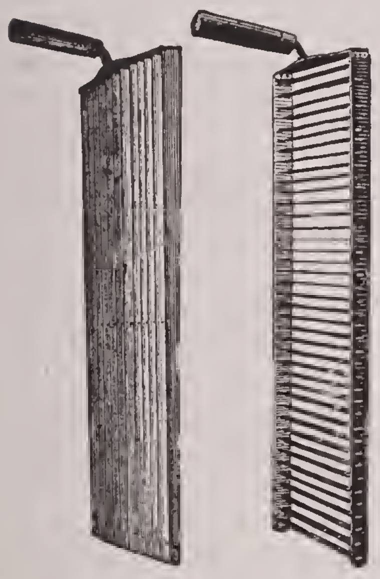


Fig. 4.—*Metallic-Head Curd Knives.*

It is then spread out until the temperature falls to 70°. In about 20 minutes it is turned over and left until it assumes the flaky and mellow condition well known to the experienced eye. When nearly dry, salt may be added, in the proportion of 4 or 4½ ounces to 10 pounds of curd.

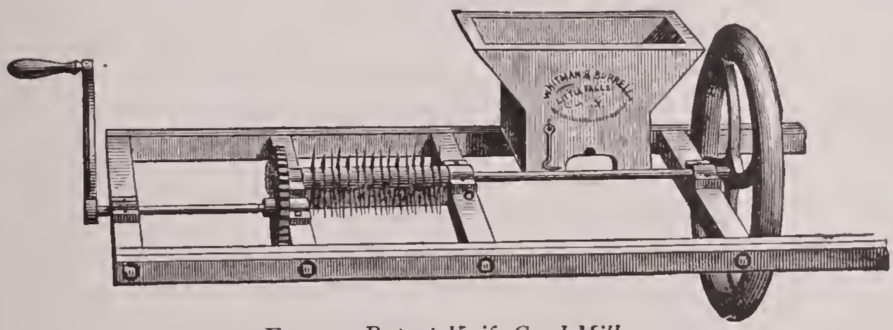


Fig. 5.—*Patent Knife Curd Mill.*

The whole is then thoroughly mixed with a curd mill. The use of curd mills has become quite general among the best cheese-makers of the country, as it is found that by the little additional labor involved in grinding the curd before pressing, a much better product can be obtained. Let the whey run off while it is sweet, then pack the curd in the vat, cover it up and let it remain until the heat and action of the rennet expel most of the moisture, and also until the curd itself becomes slightly acid, then cut or break it up into pieces, and run it through a curd mill preparatory to salting. Much better cheese with less skill can be made by the use of them.

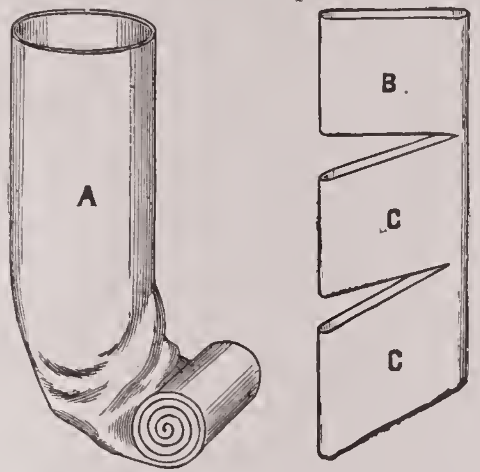


Fig. 6.—*Seamless Bandage.*

The seamless bandage (Fig. 6) saves the time and labor of cutting and making bandages; it saves cloth taken up in the old way by seam; it saves expense for thread; it saves cloth taken up in the old way by variation in the depth of cheese; it secures perfect uniformity in the size of cheese; it secures perfect uniformity in the size of box required. Every box can fit perfectly; consequently there is no trouble in removing it at any time desired; no trouble, perplexity, or loss caused by seam, as there is no seam to rip; no chance of skipper fly depositing eggs in seam, as is not infrequent in the old way of bandaging; it is a better and stronger bandage every way, at no greater expense. The bandage is made to perfectly fit cheese pressed in 13, 13½, 14, 14½, 15, 15½ and 16 inch hoops.

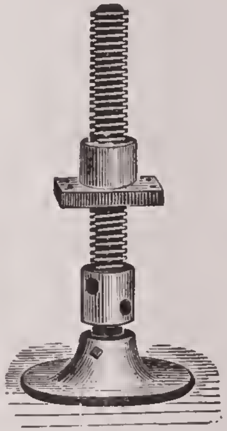


Fig. 7.—*Cheese Press Screw.*

The boxes are then placed in the press, and the pressure applied by lever and screw.

With such material as represented by Figs. 8 and 9, furnished, for example, by Chas. P. Willard & Co., of Chicago, every dairyman can make his own cheese boxes. This material is furnished of all sizes and dimensions desired.

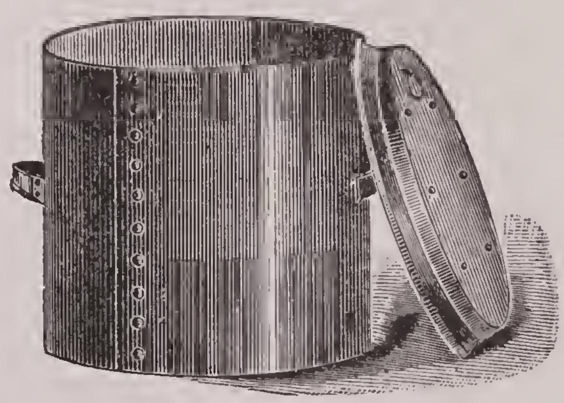


Fig. 8.—*Galvanized Iron Cheese Hoops.*

The rings are now indispensable articles with all good cheese-makers. They keep the curd from pressing up around the follower of a cheese hoop, take the place of press cloths, and prevent the bursting of the bandage at the edge in the second pressing, an experience that has always heretofore troubled cheese-makers.

The cut (Fig. 9) represents a cheese hoop cut perpendicularly. A represents the cheese hoop; B, the follower; C, the cheese; E and F, the rubber rings. One of these rubber rings is placed on the inside of the cheese hoop, resting on the press board, below the curd or cheese. The other is placed above the cheese, directly under the follower. As soon as the pressure is applied it causes the rubber rings to expand and fit tight to the hoops, preventing the curd from pressing either up around the follower, or out underneath the bottom of the hoops.

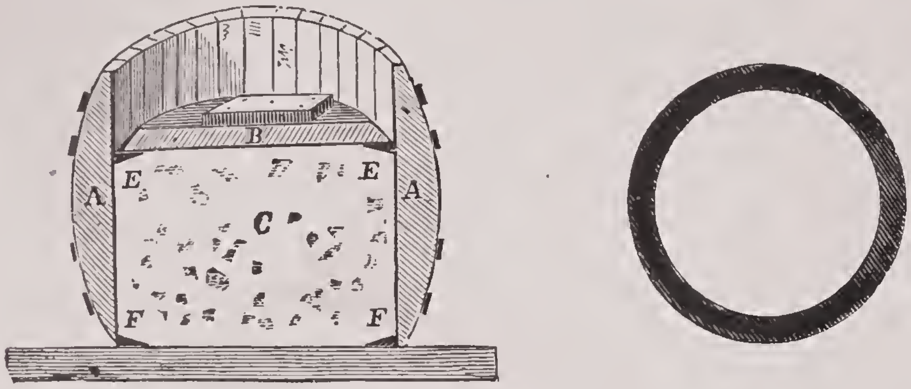


Fig. 9.—*Patent Rubber Press Rings.*

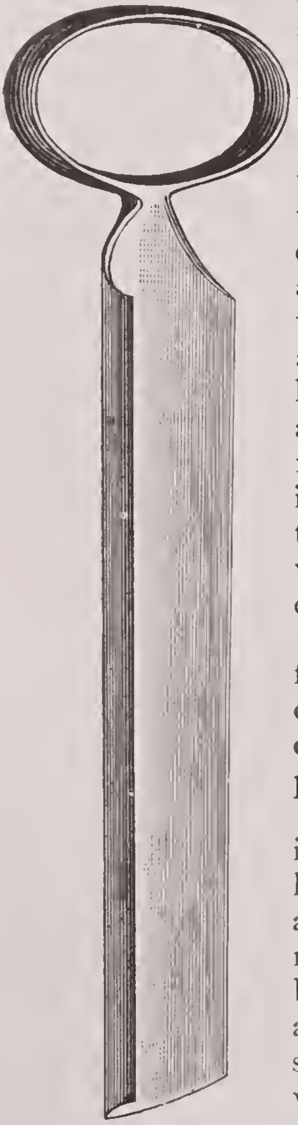


Fig. 10.—*Butter and Cheese Trier.*

By using these rubber rings, the followers may fit the hoops very loosely. They are more convenient than press cloths, are more readily cleaned, and will last much longer. They are made beveling, so as to leave a nice edge on the cheese and save all trimming. These rings have been much improved in quality, and they now answer their purpose perfectly. A trial will remove all doubt as to their effectiveness.

Fig. 10 is a cut of a utensil for trying or testing butter and cheese, to ascertain the internal composition—whether it comprises lard, tallow, etc.

After the curd has remained in the press from two to four hours it should be turned and again put into the press. The next morning the cheese may be taken out and rubbed with a little melted butter, which should be fresh and used while warm. The cheese should be rubbed thoroughly and turned every day until cured. Should the rind get dry, butter should be applied as just explained. In the case of large cheeses, a tight cloth bandage should be put around the edges, but for small cheeses this is unnecessary. Should the farmer's daily milk supply be insufficient to make a good-sized cheese, he may use the milk obtained in two or three days; that got each day may be treated as though it were enough for the purpose, until the curd is ready for the press, except that but little salt should be used. The curd made each day should be kept in a cool place in the cellar. When enough has been secured, the curds previously made may be treated with warm whey, broken up, drained, mixed with that just made, and all salted together and pressed. The mixing should be thorough. Thus good cheese may be made by farmers who keep only one or two cows. Great care should be taken or even after all this work the cheese will spoil. It should be kept in a cool, light room, on clean shelves, and should often be carefully examined. All cracks that may appear should be filled up with cheese crushed so that it will spread like butter. Thin, strong, well-oiled paper should be placed over these cracks. The shelves should be washed occasionally with hot whey and kept perfectly clean. The whole surface of the cheese should be thoroughly well rubbed every time it is turned. By this means flies are prevented from depositing their eggs on the surface, and what is more important, in the cracks which may appear. These eggs soon hatch into "skippers"—maggots—which ruin the cheese. If any mischief has already been done by them, the parts attacked should be cut out and destroyed. If detected early, they may be forced to the surface by a piece of well-oiled paper plastered over the part of the cheese in which they have settled; they can then be easily taken and destroyed. This paper should be used two or three times. The introduction of skippers may be prevented by the following process: After the curd has been pressed six or eight hours, take the cheese from the hoop. From the bandage cloth cut an exact cover for the top and bottom. Cut the bandage for the outside wide enough to lap over the two circular pieces about two inches. With a strong thread baste the edges on both sides. The cheese then will be wholly covered. Place it again in the hoop and press it until the next morning. The second pressing forces the cloth into the cheese so that the spaces between the threads are filled with cheese. Apply the common dressing at once. In this way there is no chance for the flies to deposit their eggs. They cannot get inside of the cloth.

Good cheese, if properly made, is generally fit for the table in from four to six weeks after it has been pressed. It will, however, gradually improve in quality for several months.

The curing of cheese is quite as important as any other process in its manufacture. The perfect curing of cheese involves the action of the atmosphere, inasmuch as it has been proved beyond question, that cheese, while curing, is constantly absorbing oxygen and giving off carbonic acid gas.

The curing progresses according to the quantity of rennet used. When it is desired to make a cheese fit for use in 30 to 40 days, and have keeping quality to last from four to six months, rennet enough should be used to cause coagulation or curding to begin, in night's or morning's milk mixed, in 15 minutes, at 90°, provided it is to be cured at 70° in air of average moisture. The amount of moisture in curd affects the time for curing cheese, since whey contains four or five per cent. of milk sugar, which is liable to be turned into acid and retard the curing. If there be too little moisture in the curd, the action of the rennet will be retarded, and the curing also. The drier the curd, all other conditions being the same, the slower the curing and the longer the lifetime of the cheese. The life of a cheese may be prolonged to almost any extent by simply reducing its moisture, with but little variation in other respects. A cheese which is a very long time in curing seldom cures as evenly and perfectly as when cured more rapidly. Another important point in cheese-curing is the temperature. There is always some particular temperature at which a cheese, according to its make, cures best. A cheese with a tight, rubber-like rind must be cured slowly, or more gas will be forced into it than can escape through its rind, and it will puff. A cheese full of fat must also cure more slowly to prevent over-heating. The inside of a cheese cures faster than the outside. Skim cheese requires a little warmer room than one made from whole milk. A perfect curing room puts all the other curing agencies under the control of the maker. The supply of air and the amount of its moisture must be controlled. The best curing for cheese is a basement half above and half below the ground, with walls and floor of concrete. Such a room, with close-jointed double doors and windows, would give the maker the greatest control over the temperature, air and moisture within it. Concrete walls exclude heat and dampness, and are impervious to air. The worst curing rooms are those covered with a single thickness of rough boards with the cracks covered with narrow battens. This leaves the cheese at the mercy of the wind and sun. The loss from this cause alone is enormous. Upper stories are not good places for cheese-curing, especially if they are at all open. The abundance of air in such rooms develops flavor in advance of quality. A maker who wishes to produce a mild-flavored cheese with plenty of quality—suited to the general taste of the consuming public—after using proper skill in the make-room, will put his cheese to cure in a room with walls tight enough to allow of his controlling the ventilation, temperature and moisture. He will keep the temperature at 70°, so as to develop the quality and check the admission of fresh air with a view of retarding the development of flavor. The cheese will thus become ripe and rich without getting too strong flavored. If such a curing cannot be obtained, it will pay the cheese-maker handsomely to use sheathing paper or boards on the walls—or even both—to make them double and even triple, if necessary, until the temperature can be kept within a range of 20°, and as near 70° as possible.

ADULTERATION OF CHEESE. No artificially prepared food escapes adulteration; and as cheese affords a good opportunity for disguising foreign substances, we may look for adulterated cheese the world over. The means are numerous. Bad milk, doctored milk, lard, tallow, etc., for the body, and annatto, red lead, ochre, burnt sugar, turmeric, for the coloring, besides the cheap and poor processes of manufacture employed, and the various drugs mixed in to preserve the flavor or disguise the other ingredients, not to say anything of the foul decay which perverted tastes enjoy and many encourage, all go to make up a disgusting mass of unhealthful matter.

CHEESE, TOASTED. Take a good quantity of cheese, and having pared it into extremely small pieces, place it in a pan with a little milk, and a small slice of butter. Stir it over a slow fire until melted and quite smooth. Take it off the fire quickly, mix the yolk of an egg with it, and brown it in a toaster before the fire.

CHEESE, HEAD. Boil a hog's head thoroughly done, take off all the meat with the skin, mince it and season it with salt and pepper. It will keep good and sweet for several weeks, or, in cold weather, even months.

CHEESE, OX CHEEK. *Time, four hours.* Split an ox-head in two, take out the eyes, crack the side bones, and lay it in water for one whole night. Then put it in a saucepan with sufficient water to cover it. Let it boil very gently, skimming it carefully. When the meat loosens from the bones, take it from the water with a skimmer, and put it into a bowl. Take out every particle of bone, chop the meat very fine, and season it with a teaspoonful of salt and half a teaspoonful of pepper; add a tablespoonful of powdered thyme. Tie it in a cloth and press it with a weight. When cold it may be cut in slices for dinner or supper. The gravy remaining will make a rich broth if a few vegetables be stewed in it.

Cherry. The cherry is one of our most valuable fruits, being the best tonic and anti-bilious article of diet in existence. The gum of the tree is almost identical with gum arabic, and marvelous stories are told of its nutritive properties. The wild cherry-tree, also, affords the most valuable wood for cabinet work. The cultivated varieties are too short-lived in the Northwestern States to furnish good lumber for cabinet-ware. The general characteristics of the cherry are too well-known for us to describe here, and we will proceed immediately to consider the cultivation and the varieties of orchard cherries.

CULTIVATION. The very best soil is one which is dry, somewhat sandy or gravelly, and mellow. Such a soil will of necessity have good under drainage, that is, there will generally be a gravelly sub-soil. Wet or heavy clay land produces a rank growth of the tree, and it soon decays at the heart; and being thus rendered weak, it is easily blown down by the wind. Deep, warm valleys are liable to spring frosts, and in such places it is safer to plant the cherry on the north side of the hills.

The cherry is generally propagated by budding and grafting, the former method generally being considered better. The choice of stocks on which the budding or grafting should be done are in the following order: the Mahaleb, the Morello and the common black Mazzard. The latter used to be the only stock selected, but in the West it seems to be the poorest of all, except when the roots are planted deep beyond the reach of frosts. Grafts on Morello stocks bear earlier, and sometimes they do better than those on Mahaleb, which latter are tender and somewhat short-lived. To prevent excessive sprouting it is recommended that the budding or grafting be done on seedling stocks and not on suckers. To raise these stocks the cherries should be gathered when fully ripe and allowed to lie two or three days together, so that they may be partially or wholly free from the pulp by washing them in water. They should then be immediately planted in drills, being covered about an inch deep. They will vegetate the following spring, and in good soil will be fit for planting out in the nursery rows in the autumn or following spring, at a distance of 10 to 12 inches apart in the row. The practice of leaving the cherry-pits boxed in sand until spring is too precarious, as their vitality is so delicate that if left only a day or two too long they will die. After planting in the nursery rows the seedlings are generally fit for budding in the month of August following; and in order not to have the weaker stocks overpowered by the more vigorous, they should be assorted before planting, placing those of the same size in rows together. Under good conditions the buds will make shoots six or eight feet high the first season after the stock is headed back. Grafting the cherry should be done early in the spring before the frost is thoroughly out of the ground. Although the dwarfing of cherry-trees is not practiced much in the West, we would mention that Mr. Downing recommends for this process the selection of Mahaleb stock, and that the trees should be headed back the second year in order to form lateral shoots near the ground.

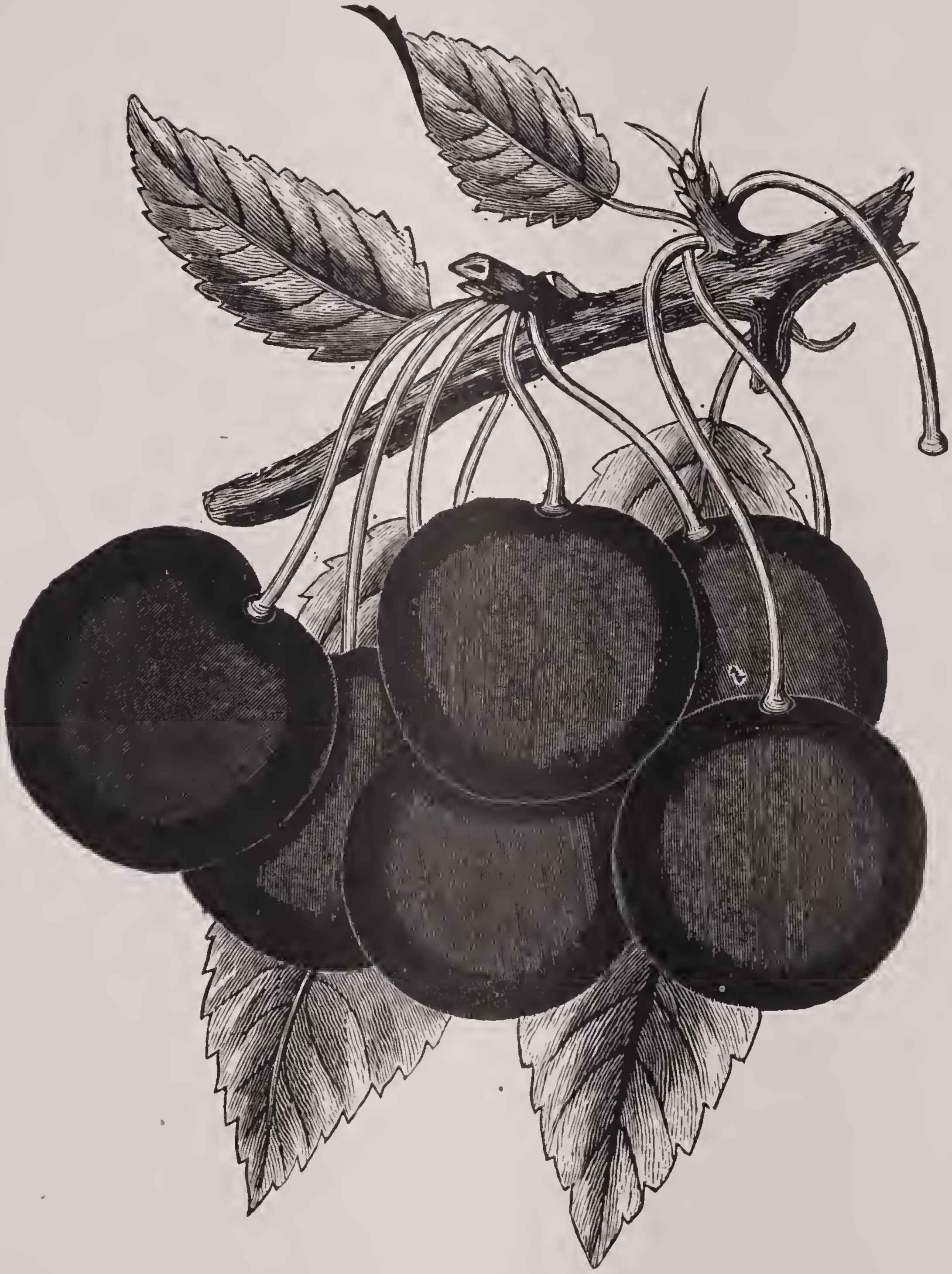
The cherry as a standard tree requires but little cultivation further than to supply old trees occasionally with a little manure to keep up their vigor, pruning out the dead or crossing branches, and washing the trunk with soft soap when it becomes hard and bark-bound. It is not well to prune the cherry very much, as the practice causes the tree to throw out gum, which produces decay. Pruning is best done in mid-summer, as then the least gum will issue. Above all trees in the orchard, the cherry should not be barked or bruised, as the gum it throws out becomes filled with microscopic organisms, which prevent healing. It is best, also, not to spend much time with old trees which show signs of decay; supplant them at once with new trees. The cherry is a rapid grower, and in the stormy West generally run their course in 10 to 12 years. In the East there are remarkable examples of size and longevity, as well as of productiveness. A few trees have attained the full forest height, measuring 10 to 15 feet in circumference and yielding 20 to 40 bushels of fruit in a single season.

"Training" the cherry is but little practiced or esteemed as yet in utilitarian America, and therefore the subject requires no treatment here.

In gathering cherries for market, they should always be picked with the stems attached and when perfectly dry. For the table it is well to place the fruit in a refrigerator for an hour or two, so that it can be brought to the table cool and with dewdrops standing upon it. For every one who has five or more good bearing trees it will pay to buy a "cherry pitter," which costs but a dollar or two.

The heart or sweet cherries rarely succeed in the West. A crop is scarcely ever realized, and when there is a crop the fruit is wormy or defective.

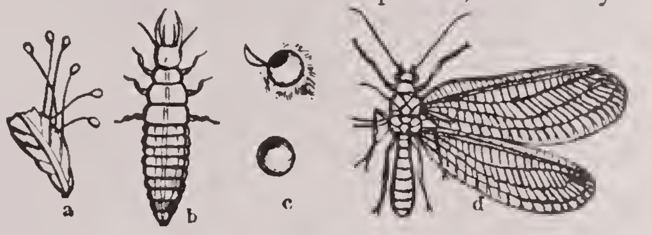
The obstacles to cherry-raising in the West are, in the order of their extent: 1. Wet, cold, prairie soil; 2. Birds; 3. Winds; 4. Curculio; 5. Leaf-blight. As to the first trouble it is advisable not to plant at all unless a slope or well-drained piece of ground can be found upon the premises. As to birds, chase them away by scarecrows or otherwise. It seems still to be a debatable point whether we should let certain birds of the thrush and woodpecker family live or not. These are the birds which do the most mischief to our orchards. Some persons plant the trees near the house, dwarf them or keep the tops low, with the branches near the ground, and then depend upon good cats to scare the birds away. This is indeed an effectual method. As to high winds, of course we can do nothing more than to set the trees in sheltered situations; that is, on the south or east side of dense groves, large buildings or steep hills. In exposed places it might pay to stay the top with strings woven through them and attached to stakes around. The curculio is worse on the plum than on the cherry, and we treat more fully of this dreadful pest under the head of that fruit. The leaf-blight is caused by a microscopic fungus which might be termed the "white mildew of the cherry." Almost everybody has noticed a white powder covering cherry-leaves, especially those in the shade and on young shoots; but scarcely has suspected that that had anything to do with the leaf-blight; yet such is ascertained by botanists to be the fact. That white substance is a real fungus (a plant of the toadstool kind), and first makes its appearance in mid-summer in the form of gossamer. These fine threads break up and contract into small granules, at



BLACK REPUBLICAN CHERRY.

which time the surface of the leaf presents a mealy appearance. This mealiness is increased by the raids of a small maggot working through it, the fungus being food for a surface-feeding parasite, which may be destroyed by dusting the leaves with air-slacked lime and flowers of sulphur, or smoking with burning coal tar and cigar stumps.

The accompanying cut illustrates an insect friendly to the cherry-tree, as it devours only certain plant lice which infest the tree. The engraving gives the natural size of the most common species, or variety.



Golden Eye. (Chrysopa.)

a, The eggs, mounted on their slender thread-like stems. *b*, The larva, with its long, sharp, sword-like jaws. *c*, The singular, small cocoons in which the pupa resides; one showing the opening and lid through which the insect has escaped. *d*, The perfect insect, showing the wings on the right side only.

The black knot sometimes infests the cherry, especially the Morello, as well as the plum, and the only remedy lies in cutting off the affected twigs and burning them.

Warm, wet weather in fall, of course, affects the cherry tree deleteriously, as it does all other fruit trees. It causes the fruit-buds to swell and grow, and then the succeeding cold snap kills the germ. Cold, wet weather in the spring, also, at the time of blossoming, will kill the fruit, or wash away the pollen before its proper function is performed.

VARIETIES. *Belle de Choisy.* Best, middle of June, or directly after the May Duke. Fruit round or slightly depressed; skin very thin and translucent, showing the net-like texture of the flesh beneath; pale amber in the shade, but in the sun finely mottled with yellowish red, the fruit fully exposed becoming a bright carnelian red; flesh amber-colored, very tender and melting, of a delicate sweet flavor; stem rather short and swollen at the upper end. Tree hardy, head upright, and a moderate bearer; leaves dark.

Black, Large or English Morello. Best, last half of July. Twice the size of the common cherry, round or obtusely heart-shaped, dark red, becoming nearly black when fully ripe; flesh dark, purplish red, tender, juicy and of a pleasant subacid flavor when quite mature. This is a standard cherry for the Northwestern States. It is second in hardiness, a splendid fruiter, and does rather better on "poor" land.

Black Tartarian, Fraser's Black-Heart, Ronald's Heart, etc. Best; middle of June. Large, heart-shaped, irregular and uneven on the surface, glossy, bright, purplish black; flesh purplish, thick, half tender, juicy, very rich and delicious; stone very small. Tree the hardiest of all the heart cherries; leaves large; head upright.

Early Richmond, Early May. Good; rather small, round, slightly flattened, lively red, tender, very juicy, acid, tree of rather dwarf habit, and two or three years later coming into bearing. This has been the most popular cherry in the Northwest for many years, more on account of hardiness, productiveness, etc., than intrinsic qualities of the fruit. Downing thinks that the two names at the head of this paragraph are of different sorts of cherry. Some think this variety does better grown on its own roots, living longer and bearing better crops. This cherry may also be propagated by layering. The Early Richmond is a little more juicy than the Kentish, not as acid, is more pleasant to the taste, ripens two or three weeks earlier, and on the whole a better fruit; it has also a smaller stone.

Governor Shannon is a fair variety for Western cultivation.

Governor Wood. Very good to best, middle of June. Large, roundish, heart-shaped, light yellow, shaded and marbled with bright red; suture half round; flesh, nearly tender, juicy, sweet, rich and delicious; stem an inch an a half long and inserted in a broad cavity. Tree vigorous, forming a round, regular head, and very productive.

Hipp is the local name of a variety of cherry which does well in some localities.

Kentish, Early Richmond. See Early Richmond.

Late Kentish, Common Red. Good, especially for pies, and the most common sort, ripening about the middle of July. Medium size, round, flattened, deep, lively red, tender and very sour.

Lieb, or *Leib*, is a variety favorably spoken of in the West.

May Duke. Very good, first part of June. Fruit roundish, or obtuse heart-shaped, growing in clusters, lively red, then a rich, dark red, tender, melting, juicy, and of excellent flavor. It is generally picked before it is fully matured, as it begins to color long before it is perfectly ripe. The head of the tree is upright from its youth up. Some of the branches produce fruit which ripens much later than that of most of the branches.

Northwest. A seedling originated by Mr. D. B. Weir, of Marshall county, Ill. Hardy, more symmetrical than the Early May, and is a regular and abundant bearer. Fruit the size of the Early May, but in shape it resembles the May Duke. The flesh is firmer and richer than the Early May.

Plumstone, Plumstone Morello. Good, last of July and first of August. Large, roundish, inclining to heart-shape, deep red, tender, juicy, and when well matured, is of a sprightly and agreeable flavor; stone long and pointed. Tree of slow growth, productive and hardy; makes a fine pyramid.

Reine Hortense. Good, last part of July. Very large, roundish, elongated, bright, lively red, somewhat marbled and mottled; suture distinctly marked by a line without any depression; tender, juicy, very slightly subacid, and delicious. Tree a handsome grower and productive.

TO CAN OR DRY cherries, see Canning and Drying.

TO BOTTLE cherries, have ready some wide-mouthed bottles quite clean and dry; cut each cherry from the stalk into the bottle; be sure not to pull them off. To every bottle of cherries put three ounces of powdered sugar, then tie them tightly over with bladder. About nine o'clock at night put the bottles into a lukewarm oven and close the door. Take them out the first thing in the morning, and put them in a dry place for use.

Cherry Brandy: see Brandy.

Chess or **Cheat.** This foreigner is a well-known pest among crops of wheat and rye,—and occasionally appears in the same fields for a year or two after the grain crop; but being an annual, it is soon choked out by the perennial grasses, and the fallen seeds remain, like myriads of others, until the ground is again broken up, or put in a favorable state for their development. The best preventive of this and all similar evils, in the grain-field, is to sow none but good, clean seed. Among the curious, vulgar errors which yet infest the minds of credulous and careless observers of natural phenomena, may be mentioned the firm belief of many of the farmers (some of them, too, good, practical farmers) that this troublesome grass is nothing more than an accidental variety, or casual form, of degenerate wheat, produced by some untoward condition of the soil, or unpropitious season, or some organic injury, though it must be admitted, by the most inveterate defender of that faith, that in undergoing the metamorphosis, the plant is surprisingly uniform in its vagaries, in always assuming the exact structure and character of Bromus. It is needless to say it is a botanical impossibility, as much so as that wheat could turn to Indian corn.

This grass has been cultivated within a few years as Willard's Bromus, and the seed sold at a high price. The farmers found that they not only did not get a valuable grass, but were really propagating a worthless and pernicious weed, being thus doubly cheated. The principal varieties are as follows: B. secalinus: panicle speading, even in fruit; spikelets ovate-oblong, eight and ten flowered; florets pubescent; awn short, sometimes very short or none; known as Cheat, Chess, Brome-grass. B. racemosus: panicle erect, contracted in fruit; lower palea decidedly exceeding the upper, bearing an awn of its own length; known as Upright Chess, Smooth Brome-grass. It is a worthless species found in grain-fields, as is B. mollis, which resembles the preceeding, but has long-awned flowers which, as also the leaves, are downy, and the spikelets are closely imbricated. By some, the two are considered as forms of the same species. There are two native species of the genus, of no agricultural value. All the varieties of chess are of but little value in agriculture, and should be treated as weeds, and, in fact, are so treated by intelligent farmers in all sections.

Chestnut, a tree of the oak family valuable for its timber and for nuts. When full-grown it is one of the loftiest trees of the forest. It is common in the eastern parts of the United States and Europe, does best on high, dry ground, and is therefore more perfect in the Eastern and Middle States than when grown in the Western. The crops even in the East are sometimes lamentably short. The timber is almost as good as catalpa for posts, rails, etc. The chestnut is propagated by grafting or by planting the nuts. Several English varieties have been grown in this country, of which the Downton is considered the best.

Chewing the Cud: see pages 183 and 202.

Chewing Gum is made by taking paraffine or spermaceti and dissolving either of them in olive oil and glycerine by means of gently heating them. It is stirred on cooling and gently compressed. The sweetening and flavoring is of course according to taste.

Chiccory. This plant, also called succory and wild endive, is a naturalized foreigner, and, being hardy where it gets hold, is a very troublesome weed. Endive, in Europe, is esteemed and used as a salad plant, when about a foot high, the tops being tied together, over the heart, and the sides earthed up, in order to blanch them. The seed should be sown early in the spring in drills, 16 inches apart, covered three-quarters of an inch deep, and thinned, when large enough, to six or eight inches in the row. The cultivation and blanching of Endive is precisely similar and the plant is a much nicer bitter salad than chiccory. The principal use of chiccory is in the roots, which when sliced and kiln-dried, are used in adulteration of ground coffee. It is raised by sowing the seeds upon very rich, deeply-trenched ground, in drills 18 to 20 inches apart, keeping the rows clear of weeds, and thinning to about six inches in the row. In the autumn the tops are cut and the roots raised by a peculiar plan, which cuts the tap-root some 18 inches below the surface, slightly lifting the roots; or by a plan which turns the roots out of the soil, at the same time covering the cut tops, the plan being to go around the field, one row being removed before the next is worked. With the sub-soil lifter, however, the earth is not turned, and this plan is preferable. The cultivation of chiccory has been introduced into the United States several times, and abandoned. It is to be hoped it never will prove remunerative, since its cultivation is simply for use as an adulterant of coffee. While its use can not be distinctly stated as injurious, it is nevertheless a fraud upon the buyer of coffee when mixed therewith. If the good wife chooses to furnish chiccory as a family beverage, well and good. The pure chiccory can be bought or raised, since its cultivation is as easy as that of the parsnip or carrot.

Chick, or **Chicken,** the young of birds, especially of the domestic fowl. See Fowl, Domestic.

Chicken Pox is a mild eruptive disease, and seldom occurs more than once in a person's lifetime. There is but little indisposition; slight chill, cough, fever and bad appetite. It comes on in four or five days after exposure to the contagion. The eruption differs from small-pox by coming out in successive crops, by not suppurating or being depressed in the middle, and by not going deep into the true skin.

Treatment: Cooling drinks, often administered, together with some good aperient to keep the bowels regular and open, are all that is necessary.

Chiffonieres (shif-on-eerz′), portable closets. These are boxes or little bureaus, with ornamental finish, and are a great convenience about any house. Many styles can be found, under various names, in good furniture stores, and simpler ones can be readily devised and made at home, with a little ingenuity.

Chilblains, an inflammatory swelling, of a purple or lead color, particularly on the feet or hands, produced by the action of cold. Children and elderly persons are generally most liable. Holding the hands and feet to the fire after exposure is a common cause.

Treatment: On its first appearance, bathe the part affected in the water in which potatoes have been boiled, as hot as can be borne. On the first attack, this bath affords immediate relief. Common copal varnish has been found most efficacious, by applying it to the part affected. If this fail, make use of pig's-foot oil. Or, apply with a small brush, or feather, three or four times a day all over the affected parts, liquor perchloride of iron: a dime's worth (2 ounces) will be amply sufficient to cure a score of cases. It acts like a charm. Hundreds of other remedies have been published.

Children. We first wish to say a few words to parents and guardians in reference to the right treatment and moral culture of their children—their duty toward them and the most efficient and pleasant way of performing it. Then we wish to address ourselves to the children, not only to the very young, but also the boys and girls as well,—those about to enter upon the stage of active life. We know it is easy to preach; it is a pleasure to preach; therefore more time and space are taken up with preaching than with rendering scientific reasons. We will try and avoid this common rut and not occupy space with moral lecturing, but merely compile, in a condensed form, the substance of what the philosophers of the day wish most to emphasize for this age.

1. We all act out our natures despite preaching and our creeds a great deal more than we think we do,—more than most persons imagine, and we assimilate to our moral selves only that moral food which we naturally like. A work, for example, like Watts on the Improvement of the Mind, is appreciated most by those who need it least, and appreciated least by those who need it most. An individual in whose nature it is to discipline himself, will do so, while a person wanting such a disposition, cannot be made to train himself, or be trained by others to a great extent.

2. To lay the foundation for a good character as deep and thorough as possible, hereditary laws must be regarded: the sounder the parents, the sounder the offspring, physically, mentally and morally.

3. In infancy children should never be teased, tickled, either on the feet, ribs, or elsewhere, tossed up and down, rocked or swung, dosed with medicines except when a good physician sees it is necessary, or fed upon bad food. On hot, sultry days they should be thinly dressed, and in cooler weather more heavily clothed, and uniformly. The feet, legs and arms need particular attention, as fashion is such that they are particularly exposed. A cross child in hot weather can generally be pacified by taking off some of the clothing and bathing its head with cold water.

4. As children grow up, no precept, especially a maxim, should be repeated to them in a rasping manner, nor even often repeated in any style. Repetition of precepts and principles of duty sours most children, and engenders a disposition in them to do the opposite. They do not like to be "sawed" any more than grown-up people.

5. Be patient in complying with the demands of the child's inquisitiveness, but discourage all that may take a foolish direction. So far as practicable, tell all that may be of benefit to the child in any way, and try to satisfy scientific curiosity; also, encourage him to think for himself. A parent should try to sympathize with the various irregular growths of a child's nature. Sensitivenesss as to peculiarities of dress is a very strong element, and it cannot be laughed down. The late admirable Lydia Maria Child said that she believed her character had been permanently injured by the laughter of her schoolmates at a peculiar short-waisted gown which her mother made her wear to school. And a very sensible mother who would not allow her little daughter to wear hoops at dancing school when hoops were the fashion, said that she was certain that by the mortification she had caused her, and the undue attention which had been given to the subject, she had made love of dress a passion with the child. On all these questions a certain wholesome inattention is perhaps the best treatment. Try to allow your child to be as much like his fellows as you can; and, above all things, do not make him too splendid, for that hurts his feelings more than anything, and makes the other boys laugh at him. The ragged jacket, the poor shoes, the forlorn cap, the deciduous pantaloon which has shed the leaves of freshness—these are not laughed at; they do not move the youthful soul to ridicule. It is a lovely trait in the character of boyhood that poverty is no disgrace. But a velvet jacket, a peculiar collar, hair cut in a singular fashion, long hair especially—these are cruel guide-posts to the young bully. He makes the picturesque wearer whose prettiness delights his mother suffer for this peculiar grace most fearfully.

6. As they grow older, let them have a little property and a purse of their own, to keep, take care of, increase and spend upon their own responsibility, with the aid of your advice, however, if very gently given.

7. Nearly all mental and moral discipline should be brought about in some ingenious and indirect manner. Youth, like older people, must be taught, as Alexander Pope says, "As though you taught them not, and new things proposed to them as things forgot." We cannot "make" a child love a thing any more than we can "make" a horse drink water. In the management and discipline of children there must be an even, steady, firm and temperate treatment, accom-

panied by a disposition of mind so much master of itself as never to yield to passion, but always to be governed by calm judgment. Perservering, yet gentle firmness, begun in infancy and practiced daily, establishes discipline, insures obedience, and almost entirely prevents the necessity of punishment of any kind. On the other hand, the gratification of the child's every whim, encouraged by frequent indulgences of improper desires, associates the idea of happiness with such gratification, and of misery with disappointments. Self-will grows rapidly; a capricious humor is the natural consequence, and the product is that pest of pests, a "spoiled" child. However, to avoid improper indulgences the parent should endeavor to avoid undue severity.

8. The parent should have the respect of the child due to his superior wisdom. This is a widely different feeling from the fear of punishment. When the fear of punishment predominates the child almost invariably becomes artful. He seeks more to escape detection of a wrong act than to avoid the doing of it. Indeed, timid children, if treated with severity, can scarcely resist the temptation to hide offenses when possible. Severity may extort confession and promise to do better, but it cannot in itself enkindle better thoughts or implant correct principles in the heart of the child. A spirit of revenge is often generated by such a course. Correction, as a general rule, in order to prove salutary and beneficial must be applied to the mind and not to the body. Children must be taught that parents are afflicted rather than exasperated by their misconduct. In this way their better feelings and their reason are brought to bear upon. This will be far more efficient than repeated recourse to the rod, or harsh rebuke, which only irritates the disposition.

9. Over-burdening a child or youth with a task further than he can see any reason for, causes him to hate the one who imposes the task. Of course, in this work-a-day world, not everything can be made perfectly smooth for a child; to undertake it would effeminate him; all that is necessary is not to over-burden him further than there is necessity, which may be plain to him at the time or soon afterward. By this rule alone, a parent or employer will retain the love of those under his care. By the way, employers and superintendents should, as far as practicable, lighten the heaviest and most exhausting work by giving the laborer something lighter to do for a while; as when digging post-holes, take a rest at pruning vines or fruit-trees, or using the team with something—almost anything else which will bring into play a different set of muscles, to rest those which have been overworked in digging. In company with a large number of laborers work is always more pleasant, and four men working together will do five times as much work as one man alone. Thus we see the reason why harvest time is proverbially a jolly time.

10. Most children exhibit special talent, as well as a few idiosyncrasies, that is, disagreeable peculiarities of character. The idiosyncrasies of childhood are generally transient, and need no special checking indeed, a special, direct effort to check transitory phases of development is apt to confirm some disagreeable trait. But idiosyncrasies setting in after the age of puberty are apt to become permanent, despite all effort to eradicate them. The best thing to do in this regard is to encourage high ambitions, so that the youth will see the necessity of eliminating all his peculiarities, in order to rise in the world.

11. Should a son or daughter cause you anxiety and trouble through their indiscretion or thoughtlessness, gently and affectionately reprove them. Harshness and anger will almost invariably cause greater perverseness.

12. And last, but not least, every physiologist at the present day earnestly exhorts all parents, guardians, etc., to instruct those under their charge in certain sexological truths before it is too late.

In concluding this advice to parents we want to make a few remarks of special character as to the treatment of the young ladies and gentlemen—children of a larger growth. The young lady as she emerges into womanhood naturally regards the subject of marriage of very great importance. They often have erroneous ideas of what is true happiness, or their judgment may lead them in the wrong direction in seeking this goal. They should be guided aright by those who have buffeted life's waves these many years. They must be taught to respect farming as an occupation, and be required to help their mothers in the work of the house and the dairy. When farmers educate their girls in a manner which will fit them to become farmers' wives, and teach them that farming is one of the most honorable of all occupations, and that the girl who marries a farmer does fully as well as one who marries a merchant or a lawyer, they will thereby do a great deal toward keeping their boys on the farm. The idea that because a young lady has married a farmer she has "thrown herself away" is one of the most preposterous ones which ever found expression in civilized society. The girl who will reject a man simply because he is a farmer shows that she has a very shallow or else a sadly uncultivated mind and a heart which is incapable of deep affection. And the farmer who will advise his daughters to reject honest and intelligent farmers in the hope of securing clerks, business or professional men, thereby shows his own lack of good judgment as well as proves that he has no genuine respect for the calling by means of which he obtains his bread. The mother who advises her daughters to "look higher" than the young men who are farmers is thereby doing a great wrong. There may be reasons why certain farmers' boys are not suitable companions for certain farmers' girls, but the mere fact that the men are farmers should weigh in their favor rather than against them.

How to manage the young men is a question of deepest interest to the farmers. How to keep them on the farm and induce them to cheerfully choose farming as their life vocation is a question hard to solve.

One of the ways in which the boys can be strongly influenced to choose farming as an occupation is by giving them the use of a small piece of land each season. Let each boy who is old enough take a plot of land each spring, and plant it with such seeds as he chooses. Give him time to cultivate the crop, and allow him to use the team when he needs it. The money obtained from the sale of the products of this piece of ground should be his own to use as he desires. Such a course will prove beneficial in several ways. It will lead the boy to take a deep interest in thorough farming, and induce him to study the best methods of cultivation in order that he may obtain as large a sum of money as possible. It will show him the real worth of a dollar, and lead him to spend his money wisely.

Many a boy has soon "run out" a fine property left him by his father, because he had no clear comprehension of the difficulty of obtaining money. The father who gives his boy spending money does a great deal better than the one who never allows him to have any, but it is by far the best plan to have the boy earn the money which he spends. The boy who earns a dollar by growing fruit or grain, understands that the dollar represents a certain amount of labor. He appreciates the money, and knows its actual worth far better than the boy whose father gives him some outright. Such a plan will enable the boy to buy books, or take papers, with his own money. It will tend to make him industrious and frugal, and may be made the means of great good to the boy, and, indirectly, prove an almost equal benefit to the father. If it is not convenient to allow the use of land, the farmer may give his boys the entire care of the poultry, requiring them to pay for the food which is consumed, and allowing them to retain the money received from the sale of chickens and eggs. Or two or three sheep may be given to a boy to care for, he paying the cost of keeping, and having the money obtained from lambs and wool for his own. In some such a way the boy may be inspired with a love for the farm, and induced to lay a good foundation for a successful business career thereon.

To the Young. If you are living with your parents, remember that amid all their scoldings and coldnesses, amid all their faults and shortcomings, at heart they love you more than all other persons in existence. If they should see you abused by strangers, they would defend you with a greater zest than any one or anything else in this world; they will fight for you as a tiger fights for her young, or "rush into the jaws of death," if need be; and do all this, too, with a greater pleasure than they could otherwise experience. This parental sense we can scarcely call love; it is something far beyond or above it: indeed, there does not exist anything in human nature more perfect than the affection which parents bear for their children. The slender cord of friendship which binds one person to another is often broken without a struggle; a word, a look may snap its threads, never to be re-united. It often proves false in the hour of need, or grows cold by the lapse of time; but it is seldom, though amid greatest tribulations, that the parental heart, especially that of the mother, turns from its offspring.

Never be treacherous; that is, whenever you are trusted with anything, be faithful to that trust. The reward of such fidelity is sure to come even in this world. If you live even but a few years longer, it will come in the shape of high positions in society, and probably high offices in the gift of the State. Daniel Webster said there was plenty of room for lawyers, in the upper story of the legal profession; we can say with much more emphasis, there is plenty of room for honest men and women, in the upper story of society and of political preferment. One reason why many persons do not get along in the world, is because they cannot be depended upon. They do not keep their agreements. When they are weighed in the balance of actual affairs, they are often found wanting. They are seldom on time. The workman who is always on time and does his work according to agreement, is sure to get along. To a young mechanic starting in life, the habit of promptness and punctuality is worth more than $1,000 cash capital—although $1,000 is not to be despised. The trustworthiness of the faithful workman produces money, but the untrustworthiness of the unfaithful one causes him to lose money. This is an everlasting principle. He who would be permanently prosperous must keep his engagements.

Another chief requisite to a successful life is honesty. We might couple with it as a twin sister, strict integrity. Let honesty and strict integrity in every transaction of life be your characteristic. Let a man have the reputation of being fair and upright in his dealings, and he will possess the confidence of all who know him. Honesty is not only right but it is the best policy. Remember this, young man; do not believe it is a false statement. It has been proven true to the satisfaction of millions of wise men in all ages of the world. Think not that with you it will be different.

Be cautious. Weigh things well before you endorse or accept them. Slowness of belief and a proper distrust are essential to success. The credulous and confiding are ever the dupes of swindlers and impostors. The majority of men who have lost their property will invariably tell you it was through misplaced confidence. One lost by endorsing for a friend or neighbor; another by fraud or by false representation; another by crediting one whom he believed honest and able to pay. Judge of men by their actions and not by their cunningly devised statements. Observe their every movement; learn their motives and their ends. Notice what they do and say in their unguarded moments. It is your duty before trusting a man, or putting in his power the means of causing you to lose, to know as much about him as possible. Learn his history, his habits, inclinations and propensities; his reputation for honesty, industry, frugality and punctuality; his prospects, resources, supports, advantages, and his disadvantages; his intentions and motives of action; who are his friends and enemies; and what are his good or bad qualities. You may learn a man's good qualities and advantages from his friends; his bad qualities and disadvantages from his enemies. Make a due allowance for exaggeration in both. Finally, examine carefully before engaging in anything, but when you have decided, act with energy.

To a young man or woman just emerging into active life, order and system in the management of their affairs should receive due attention. Nothing contributes more to economy of time and rapidity with which work may be accomplished. Have a place for everything, and everything in its place; a time for everything, and everything in its time. Do first what presses most, and having determined what is to be done and how it is to be done, lose no time in doing it. Without this method all is hurry and confusion.

Another important feature to be observed by the young beginning active life is politeness. Agreeable manners contribute largely to a man's success. Take two men having equal advantages in every respect, but let one be gentlemanly, kind, obliging and conciliating in his manners; the other harsh, rude, and disobliging, and the one will become rich while the other starves. For further advice on this topic see Etiquette.

To be prosperous in the way of money-getting, one must observe another very important principle; that is, industry. Constant, regular, habitual and systematic application to business will in time, if properly directed, produce great results, whether on the farm, at the bench, or in the counting-room. It will lead to wealth, just so surely as idleness, inattention, vice and drinking leads to poverty.

The art of money-saving is no unimportant feature of a successful life. Without frugality none can become rich. This should be taught the young. Children may be educated to save even when quite young. Remember there is a difference from legitimate economy and being mean and miserly. Who ever knew a prudent, economical, saving man to come to want? but we see hundreds born to wealth, who, by extravagance, have died in want and misery.

Let it be deeply impressed upon the minds of the young the terribleness of falsehood. When once concealment or deceit has been practiced where all should have been fair and open as day, confidence can never be fully restored. Distrust will ever hover over such an one. How many otherwise happy lives have been made miserable because prevarication and deceit were the controlling habits of their lives. How many young men's hopes have been blasted by one false step.

While most earnestly desiring to instill into the minds and hearts of the young a hatred of falsehood, with equal emphasis we urge them to cling to truth and despise not religion. The teachings of the humble Jesus, if only observed, will make you a better man, a more honorable citizen, a kinder father, and a more dutiful husband. Religion is the most important subject that can interest the attention of man, for the effects of religion are felt amid all the vicissitudes of fortune in this life. Indeed, that which interests the immortal spirit, which will decide its destiny during eternity, is so far above the petty considerations which agitate the world, that no comparison can be drawn between them. Christianity enters the hut of the poor man and sits down with him and his children. It makes them contented in the midst of their privations, and leaves behind an everlasting blessing. It walks amid all the pomp and splendor of wealth as a purifying, ennobling and redeeming angel. It is alike the beautiful companion of childhood, and the comforting assurance of age. It adds dignity to the noble, gives wisdom to the wise, and new grace to the lovely. Young man, young woman, you cannot afford to ignore the religion that the Son of God established in the world. Without it the highest success and enjoyments of life never can be attained.

The young are ever impatient. Especially does it seem so of the young men of the country. They easily become dissatisfied with their mode of life, and seek to better it by changing. This change almost invariably points to the city. Their young minds have been dazzled and blinded by the exaggerated stories of stupendous fortunes made in a day in the great cities; of the pleasure, high life and excitement these great centers afford. Young man, be not deceived, for not one in a thousand who go to the city ever realize their fond hope's expectation. The great majority who flock there settle down to a life of drudgery and disappointment. Stick to the farm, is our often and repeated advice. Realizing how prone the young are to desire to go to the city, and knowing the unhappy results, we most earnestly desire to impress upon their minds as indelibly as possible this advice. Farming is an honorable, lucrative and pleasant business; and if nine-tenths of the young men who leave the farms and go to the cities would work as hard upon them, live as cheaply as they often have to, they would become wealthy and influential, whereas they neither have wealth, influence nor happiness.

We further give the following advice to be observed both by the child and youth.

Be not contentious for your rights; if you cannot obtain them peaceably, let them go. Nations fight one another because there is no higher court to adjust claims between them.

Be you ever so mad, or disturbed in your feelings, do not exhibit that you are thrown off your balance and unable to reason coolly. Worded shortly: Do not show bad temper.

Do not protract controversies.

Be kind and obliging in little things; let no opportunity escape.

Treat your school-teacher on the same general principles of politeness that you would any one else.

Be punctual. This is the surest way to advancement in position in after life.

Gossip is such talk about your neighbors as has a bad influence.

Those who are too talkative do not know it. "A fool is known by his multitude of words."

In conversation, refer to yourself just as little as possible, and then in such an indifferent manner that it will not call attention to yourself.

Pure language is the surest ladder to high position in society, irrespective of other merits.

While punning and playing with words is admissible as far as it is sure to create no ill feeling, be careful not to prevaricate, or get in the habit of saying one thing in earnest while you mean another.

Never play "practical" jokes; they are always dangerous.

Avoid affectation, which is the vice of taking on an air of superiority.

Do not be conceited, pretending to know more than you do.

Be affable, ready to listen and to respond with as much endorsement of your friend's sentiments as you can conscientiously give.

We have an especial word to the farmer's boy, who is busily engaged upon his father's farm. Your present duties are here: perform them to the uttermost. Observe the advice given above, heed what we now give, and your life, we doubt not, will be honorable, prosperous and happy.

To the farmer boy at work: You have almost a constant fear lest your father (or employer, as the case may be) will not think you have done work enough for the day, or the half-day,—a fear lest he will not see what invisible difficulties you had to overcome. Your work, too, on some days will not show off to as great advantage as that done on other days, and your employer, not being by your side through it all, like almost everybody else, will be governed more by appearances than by the hireling's account of the matter. Sometimes the obstacles in the way of accomplishing the usual amount of work lie in the nature of the ground, sometimes in that of the crop growing upon it, sometimes in the team with which you work, and sometimes in the plow, harrow, machine, harness, or other "rigging" you have to use; but oftener than in any other way, perhaps, they occur in the conditions of your body and of the atmosphere. Some days the air is full of heated, noxious vapors, and is so oppressive and enervating that one cannot possibly do as much as he can on other days. Sometimes one can do twice as much as at other times, and not feel so exhausted; yet how few men who conduct a farm seem to recognize this fact! and how many scoldings the boy receives for not doing as much one day as he did some other given day.

Many employers have a very awkward way of telling what they want done, and of making themselves understood. They are sometimes coarsely organized, ignorant, and consequently very conceited, and imagine they tell everything plainly enough, and that they are more reasonable and honest than any of their neighbors in all respects.

You receive orders from such a one, go out into the field to execute them, and behold! his orders do not apply to the work at all You are in a quandary. "What shall I do?" you inwardly exclaim. Although ashamed to go all the way back to the house to have the orders repeated more clearly, or to get further information about something (and it is often a half-mile or a mile to the house) you have to go. On reaching the house, lo! the man has gone to town or off hunting cattle. The half-day is almost wasted.

Often there are not sufficient pains taken that a full understanding be had as to all the particulars, and a disagreeable quarrel follows, with this language:

Man.—"You did not harrow that low piece of ground beyond the oats the other day."

Boy.—"You didn't tell me to."

Man.—"I did. I told you to harrow it if you got the other piece done before—"

Boy.—"You didn't say any such thing. You said that," etc.

The boy should have modestly replied, "I did not understand (or notice) that you told me to harrow it," and said nothing more; and the father or employer should with equal modesty acknowledge that he may have not distinctly enough expressed himself, and say no more. We cannot expect all men to be philosophers, much more than boys nearly grown. The judgment of the man is generally the best; but if he were a philosopher he will not act as if he were perfect and the boy wrong in every matter of difference. In case of hiring out the boy should speak beforehand for these little but serious points of justice and reason, as well as for all the pleasures and liberties he may wish to enjoy, arranging for a large margin, and then ever afterward be a little more steady and faithful to work than he had led his employer to expect. This will keep up pleasant relations.

We close by reference to some of the pleasant pictures of a young farm laborer's life:

In solitude, while laboring, perhaps, at the farthest corner of the farm, plowing corn, how the mind will run upon various subjects, taking imaginary excursions, devising great schemes, making up eloquent speeches, and anticipating the scenes of harvest, of autumn, and of winter! But how often, too, the forenoon seems so long,—so much longer than usual, and the eyes cast up toward the house to see the dinner flag hung out! But this longing is as often for rest as for dinner.

One morning will be fresh and the air bracing, the birds are singing and everything seems to be looking up, and your task light and pleasant. Just for the time the feeling is that nearly all work might be made as pleasant; but the very next morning is hot and sultry, and the horizon shows signs of a thunder-shower. "How I wish that cloud would hurry up here and cool us off a little, give us some rain, and me a little rest!" In a dry season that cloud generally disappears without giving you any rain; but a wet season is "a great time for hired men and young ducks."

There is a strange and irresistible influx of youth of the country to the towns and cities. They are allured somewhat by the imagined "honor" of being a city resident, somewhat by the sights and vivacity of the thronged thoroughfare, but more than all, perhaps, by the lottery chance of making a sudden fortune, or of having at least an easy and honored position, where the labor is light and the pay is heavy. Their sober judgment teaches them that such positions are as scarce as lottery prizes,—one prize to a thousand blanks; but such is human passion, each one thinks *he* has got a "sure thing," until he has acquired some experience, while the other "feller" has "acquired" the money. Were it not for legislative prohibition, the people would "lottery" themselves to death—to a complete pecuniary death. City life with the masses is one of the greatest drudgery and poverty. Those that are not overworked and die prematurely are rushed on to premature graves by dissipation and debauchery. Real happiness and the charms of life are seldom found in the city. Indeed, city life is purely an abnormal state. The highest enjoyment is experienced in the rural districts. The legitimate charms of life and all poetry are in the country. The highest poetry is in the wilds of nature. Not one true poet in a hundred has been born and bred in the city. Let any thinking genius, whose infant eyes were first taught to see by the trees and plants, birds and insects, hills and streams of the vast wilderness, and all whose senses were trained by the experiences of farm life, go to the city and confine himself to office life there for a few months or years, and he will long to return and dwell upon the farm; he sees poetry only there; but let one who is born and brought up in the city—well, as a general rule, he has neither body nor soul, for either city or country life. Therefore we conclude: Go to the city on business; go visiting; go often; stay long enough to see everything new; but *live* upon the farm.

For full information in reference to seeing the sights of a city and advice to the farmer visiting the city, see Traveling.

Chill, in casting iron, is to pour the melted metal against cold metal in the mold, to render certain parts harder, which are more exposed to wear.

Chills and **Fever,** intermittent fever; ague. See Ague and Fever.

Chimney. In constructing a brick chimney, the thickness of five bricks, with the intervening mortar, makes a foot in height; to leave a flue (passage for smoke) four by eight inches, requires five bricks to the round, or 25 to the foot in height, and each brick added to the round increases the dimension of the flue on one side or end by four inches; thus, to leave a flue eight by eight inches, requires six bricks to the round, or 30 to the foot in height; a flue 8 by 12 inches, 35 brick to the perpendicular foot; a foot square, 40 brick to the foot, etc. By these data any one can readily calculate the number of brick required for any regular chimney. As chimneys are generally not uniform in their size from bottom to top, of course each section must be calculated separately and the results added together to obtain the total. A large chimney, say with an aperture a foot square, or 12 by 16 inches, is far better than a smaller one, even for a stove; and a flue should never be diminished at any point above the smoke entrance. Masons and builders generally insist on putting up a house or a chimney in a certain way, which is the fashion at the time and which they are most familiar with, and often succeed in persuading the proprietor to adopt plans which are not the best for comfort, if they are for looks; but the proprietor should have his own way, where he wants comfort and convenience, even though he has to discharge the obstreperous mason or builder.

In the measurement of a chimney, however, to calculate the mason work, it is counted as solid, outside measurement, to allow him for the trouble of forming and plastering the flue. Thus, a chimney 16 by 24 inches, or two bricks by six, outside measure, would count 60 to the foot; and the thousand brick he contracted to lay would run the chimney up only 16⅔ feet. In chimney breasts, take the width of the face on each floor, and multiply by the height and by the thickness projecting into the room; the fire-place not deducted. When projections on the top exceed two courses of brick, two courses to be added to the height.

To examine a chimney, after it has been used, hold a piece of looking-glass, inclined at an angle of 40° in the hole in the chimney where the pipe enters, and if you can see the light of the sky, you can see the whole of the interior of the chimney and any obstruction therein.

To put out the fire of a burning chimney, shut all the doors and throw into the stove or fire-place, as the case may be, a handful of salt.

Chinch Bug: see Wheat.

Chine, the ends of the staves of a barrel, outside the heads.

Chisley (chiz′ly), having a large admixture of small pebbles or gravel: said of a soil between gravel and clay.

Chives: see Cives.

Chlorine, a greenish-yellow, irrespirable, poisonous gas. It is pungent, fuming, and of great chemical activity. When chlorine is combined with metals the substances are called chlorides, as chloride of sodium (common salt), chloride of hydrogen (muriatic acid). Chlorine also unites with lime and soda, forming feeble compounds, the chlorides of lime and soda. Chlorides are erroneously called muriates, and muriatic acid should be called hydrochloric acid. Chlorine gas is prepared by pouring hydrochloric acid on the black oxide of manganese; also by heating sulphuric acid with common salt and the manganese. This gas is a disinfectant, and for this purpose is made and used as follows: Take an ounce or so, depending on the size of the place to be disinfected, of black oxide of manganese, and hydrochloric acid of sufficient quantity, carry them to the place where they are to be used, pour the one into the other, and close the doors, having first removed all the animals out of the place. A spirit lamp placed under the bottom of the vessel holding the materials, will insure a greater volume of gas. Chlorine when sufficiently and properly used is considered to be of great advantage in arresting the ravages of glanders, farcy and other distempers in the horse, of pleuro-pneumonia and contagious typhus in cattle, and small-pox in sheep. It will cost no more than $3, and consists of a small lamp with a stand, so formed that a small glass bottle can sit right above the blaze of the lamp, while from its wide and open mouth issues the disease-healing and health-restoring gas.

Chloroform, a chemical, volatile compound, the the vapor of which when taken into the lungs renders one in part insensible to pain and in part heroic, through a peculiar blinding of the sensations. It has been the chief anæsthetic for many years, but, on account of its danger, ether and other agencies are taking its place. No one but a responsible physician should undertake to administer it. Chloroform is an excellent stimulant, when given to horses having a chill, or shivering fit, from congestion or from cold, and is equal to turpentine for the cure of colic. An excellent liniment is made by adding one ounce of chloroform to two of olive oil.

Dose. Chloroform is given to the horse and cow, in doses from one to two drachms, mixed in weak whisky, and repeat every two or three hours, or till the colic is relieved.

Inhalation. The inhalation of chloroform, by either horse or ox, is attended with risk, provided the animal be not secured or tied, so that it cannot get loose; because some horses and cattle become completely wild when the effect of the inhalation commences to act upon the brain. On the other hand, some horses will quietly stand up, others will quietly lie down under it. Two to four ounces are sufficient to produce anæsthesia, or loss of sensibility.

The usual way of giving chloroform by inhalation is by pouring about two ounces of chloroform on a soft and moist sponge, whilst the animal is tied down, and holding the sponge to one nostril only, covering the nose loosely with a large towel to save the fumes of the chloroform, using great care not to exclude the admission of pure air with the fumes of the chloroform. In all operations lasting any length of time, humanity and fine feeling demand the outlay for a little chloroform. It is not necessary to destroy completely all feeling, just sufficient to blunt the sensibility of the nerve centers.

Chocolate (chock'o-let), a paste composed of the roasted kernel of a tropical tree, ground and mixed with other ingredients, usually a little sugar, cinnamon or vanilla; also the beverage made from this paste. Chocolate is generally adulterated with flour, potato starch, sugar, cocoa-nut oil, lard, tallow, red ochre, yellow ochre, red lead, vermilion, sulphate of lime, or chalk, etc. People can enjoy just as much of life without using it as by adding it to the numerous more healthful beverages at hand. To prepare the beverage, scrape up about ¼ of a pound of the chocolate cake into a saucepan with 2 gills of water; set it on the fire; stir it constantly with a wooden spoon until it is rather thick, then work it very quickly with the spoon. Stir in a pint of boiling milk by degrees and serve it.

Choke-Damp, carbonic acid gas, generally as it is found at the bottom of some wells. No well should ever be entered without first letting down a lighted candle or torch of some kind, to ascertain whether that gas is present. If it is there, the blaze will be extinguished. By throwing down a quantity of water or cloths, good air can be forced down to take the place of the "damp;" but a thorough pumping would do better work. This gas sometimes collects in cellars, old cisterns, etc. In case of suffocation from this heavy gas, remove the patient to fresh air, dash cold water over the head, neck and chest, carefully apply smelling salts to the nostrils, and keep up the warmth of the body. When breathing has ceased, treat as for Drowning.

Choking. When a person has a fish-bone in the throat, insert the forefinger, press upon the root of the tongue, so as to induce vomiting; if this does not do, let him swallow a large piece of potato or soft bread; and if these fail give a mustard emetic, or one of salt and water.

Cholera, Asiatic, violent purging, vomiting and prostration; caused by anxiety and fear, in connection with bad diet, and possibly a weak state of the bowels and certain germs in the atmosphere. "Cramps" generally set in just before death, and continue a while after the patient has breathed his last. Medical treatment usually consists of hot applications, both externally and internally, special attention being required to keep the extremities warm. The odor of drugs in the room aggravates the disease. Keep the head cool with a wet cloth; warm up and cleanse the bowels with injections of warm, pure water; and no food should be taken until the violence of the attack has abated, and then it should consist of farinaceous gruels, the soft part of fresh, warm graham gems, or graham crackers with a little cream. These things do until the physician arrives, who should be sent for as soon as possible after the attack is suspected. Don't do any drugging.

Cholera Infantum is very fatal among children, and may be known from the following symptoms: Diarrhœa, vomiting, want of appetite, languor, head hot, abdomen swollen,—in some cases constant diarrhœa and vomiting until death. It often comes during teething and previous to the fourth year. The blood is impure and the disease seems to affect the whole digestive apparatus. After the stomach and bowels have been evacuated, give charcoal and magnesia, or the latter alone. When there is much irritability, clysters of flaxseed tea, mutton broth, and starch, with a little laudanum in them, will give ease. Fomentations of the bowels and abdomen are useful. After the violence of the symptoms is over, give the Peruvian bark in powder or decoction, adding a little nutmeg. Or use a tea of avens, or bayberry root, or the leaves of red raspberry. The removal of children to the country, abstaining from fruit, the use of flannel and the cold bath, are the means prescribed for prevention.

Chloride of Lime, also called lime chloride and bleaching powder. It is a chemical combination of chlorine and lime. Chlorine is a greenish-yellow gas, irrespirable and poisonous; but its combination with lime constitutes a very different substance. It is a good disinfectant, and is an excellent stimulant to unhealthy ulcers. Chloride of lime has been highly recommended in tympanitis in the horse, and hoven in cattle, arising from eating wet clover. The dose, as given, is from two to four drachms, mixed with cold water. As a disinfectant it may be sprinkled on the stable or barn floor every morning; but a good way would be to suspend it in a box having many small holes in it and hung from the roof of the house. If the house be large, two or more boxes may be used.

Cholera Morbus arises from a diseased condition of the bile, often brought on by the use of too much unripe fruit and vegetables, usually commencing with sickness and pain at the stomach, followed by the most severe pain and griping of the bowels, vomiting and purging, which soon prostrate the patient. The thirst is very great, evacuations tinged with bile, and often progressing some time, nearly all bilious.

Treatment. Apply flannel cloths, wrung out in hot water or spirits, over the whole surface of the stomach, immerse the feet in warm water, or, if the patient be in bed, bottles filled with hot water and kept to the feet will answer. Drink freely of warm pennyroyal tea and composition powders. If these means fail, give 60 drops of paregoric, and put a strong poultice of mustard upon the stomach. When the pain subsides, give a dose of castor oil, to carry off the remaining bile. Those subject to this disease should always wear a flannel next to their body, be cautious of their diet, and avoid exposure to the damp, cold air.

Many prescriptions for this complaint are made of astringents, as, ginger, rhubarb, pepper, laudanum, paregoric, lye, peppermint, wormwood, etc., etc.—all on the principle that the only thing needed is to "lock up" the bowels, or stop the diarrhœa. The diarrhœa is evidently nature's method of throwing out matter which ought not to be in the body, and locking the bowels is therefore just the thing *not* to do. Enemas of water, of the most comfortable temperature, generally tepid, will best aid nature in this work, and the diarrhœa will then naturally stop, for want of work to do.

Chowchow, a kind of mixed pickles; also mixed, as chowchow sweetmeats, etc. To make chowchow, take two quarts of small onions, four of small cucumbers, and three cauliflowers; cut the cauliflowers and cucumbers into small pieces, and soak in strong salt water over night; then rinse well, and boil in vinegar until quite tender; mix one pound of the best ground mustard and two ounces of the best salad oil with enough vinegar to mix it well; then stir in while boiling; just before taking from the fire add three ounces of fine red pepper; it is then ready to bottle.

Chowder, a dish made of fresh fish, pork, biscuit, onions, etc., stewed together. To make it, take a pound of salt pork, cut into strips, and soak in hot water five minutes; cover the bottom of a pot with a layer of this; cut four pounds of cod or clam into pieces two inches square, and lay enough of these on the pork to cover it; follow with a layer of chopped onions, a little parsley, summer savory, and pepper, either black or cayenne; then a layer of split Boston, or butter, or whole cream crackers, which have been soaked in warm water until moist through, but not ready to break; above this lay a stratum of pork, and repeat the order given above—onions, seasoning (not too much), crackers and pork, until your materials are exhausted; let the topmost layer be buttered crackers, well soaked; pour in enough water to barely cover all; cover the pot, stew gently for an hour, watching that the water does not sink too low; should it leave the upper layer exposed, replenish cautiously from the boiling tea-kettle; when the chowder is thoroughly done, take out with a perforated skimmer and put into a tureen; thicken the gravy with a tablespoonful of flour and about the same quantity of butter; boil up and pour over the chowder; send sliced lemon, pickles, and stewed tomatoes to the table with it, that the guests may add, if they like. Before putting in clams, the heads and hard, leathery parts should be cut off.

Chrysalid (cris′a-lid), or **Chrysalis**, the form which caterpillars and the larves of some other insects assume, in which to develop into the winged or perfect state. In this condition the insect has a kind of shell or a silken cocoon around it. "Pupa" is another term for chrysalis, and to "pupate" is to pass into and through the chrysalis form.

Chufa, or Earth Almond, is a sedge bearing sweet and nutritions tubers upon its roots, which taste somewhat like almonds. The plant will yield 200 to 500 bushels of tubers to the acre, and is said to be a profitable crop in the South, where it is extensively raised for hogs and other farm animals. The crop is propagated by planting the tubers, or "nuts," as they are often called, in drills three feet apart, and six inches apart in the drill.

Church, a building dedicated to Christian worship. The word is also used to designate a body of Christian believers, observing the same rites, and acknowledging the same ecclesiastical authority. There are few farmers but are more or less interested in their neighborhood churches. They may not be prominent or active members of any congregation, or even connected with it in any way, yet there are but few intelligent farmers who do not recognize, to some extent, at least, the importance of a good, live religious congregation in their neighborhood. There are none so indifferent but that they take more or less pride in having a neat, tasty and well-kept church edifice in their community. The character of the church and school buildings of any neighborhood is a good index to the character of the people living there.

people to erect a church building, the first step, after having selected a building committee, which should be composed of the best business men accessible, is to select the location. A somewhat elevated site affords a more beautiful aspect. The convenience of the majority of the members should be borne in mind, and the location be as central as possible. Of course this should not prevent varying one way or the other a short distance, in order to get a beautiful site.

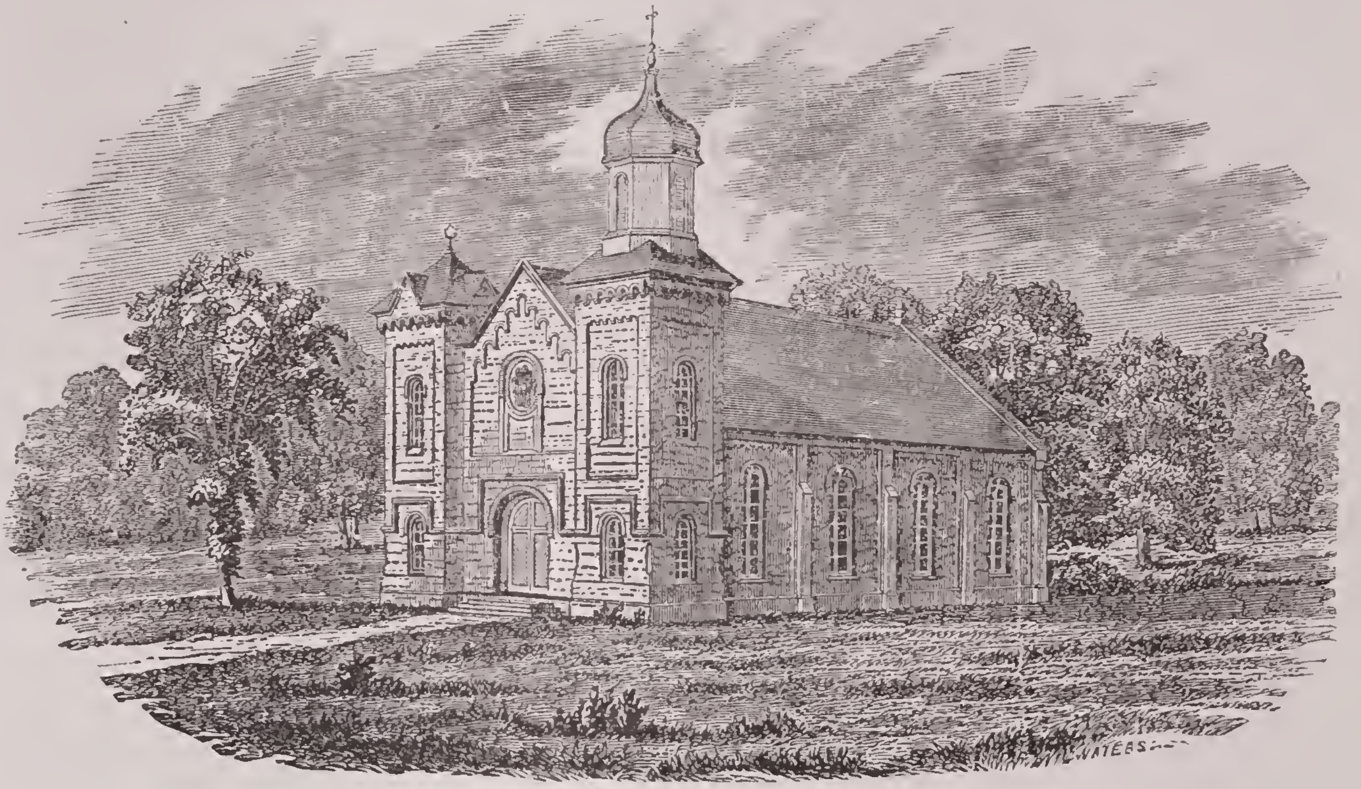


Fig. 1.—*A Model Country Church.*

The location once selected, the plan of the building must be adopted and well understood. It must be adapted to the site chosen. A plan may be admirable in itself, and yet unsuited to any particular spot. Adopt no plan hastily. It should be carefully studied, examined in every light, looked at from every point of view. There are many things to be taken into consideration. The site chosen, the plan adopted, the building should be so placed as to present an agreeable appearance, with reference to the main points from which it is seen.

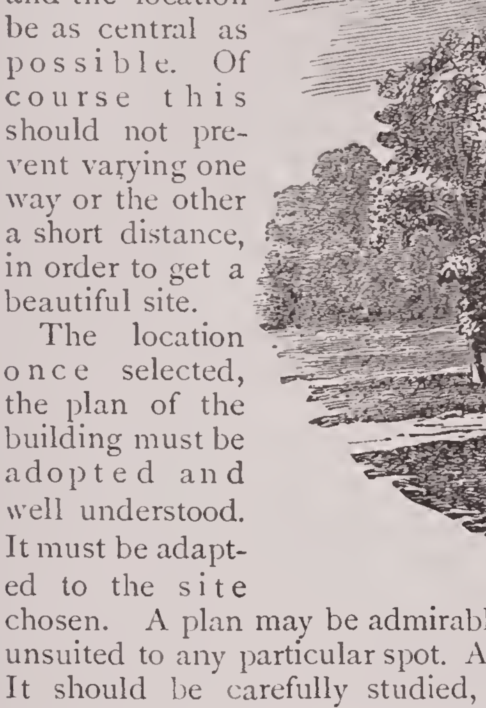


Fig. 2.—*Ground-Floor Plan.*

The architectural beauty of the exterior should not be overlooked, but it must be borne in mind that in erecting a building of any kind the first thing to be considered and the last thing to be lost sight of, is the use to which it is appropriated. A country church should be as pleasant in appearance, as beautiful in finish and as tasteful in furniture as the residence of the most cultured.

The materials to be used in construction will necessarily have an influence in choice of style. Wood is the material most generally used in the country. This arises chiefly from its abundance and cheapness. A greater variety of form and more elaborate embellishment may be secured at a given expense in the use of wood rather than stone or brick. Where stone can be procured it is the best of all materials for a church edifice. Brick may be substituted in designs where stone cannot be had without too great expense.

Ventilation is an important feature to be observed in building a church. In many of the country churches the windows and doors are kept closed, and the oxygen of the air, being rapidly consumed by the burning of the lamps and fires, and by the inspiration of the congregation, it is impossible for one to remain long in such places without feeling the evil effects of the bad air. Poor ventilation often accounts for the dullness of sermons and the drowsiness of congregations. See to it, that proper ventilation has been provided.

We give an excellent design for a country church, the elevation of which is represented by Fig. 1, and the ground plan by Fig. 2. It will not suit every one, or every location, but it will furnish ideas for all. It may be modified and changed to be adapted to location and outlay desired to be made in the erection of a church.

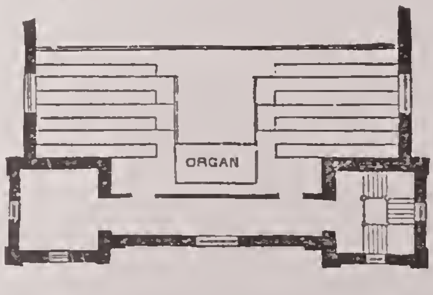


Fig. 3.—*Gallery-Floor Plan.*

The height of this church from the floor to the eaves is 17 feet, and the whole height of the ceiling about 22 feet. It is planned for a gallery across the front only. It will seat 400 people. The same ground plan may of course be so executed as to give much greater accommodations.

Churn, a vessel in which butter is produced from cream by agitation. The various kinds of churns are very numerous, and for each some special advantages are claimed by its advocates. It is not proposed to discuss here the relative merits of different churns, but to point out, if possible, the best principle on which churning can be done, and leave the choice of the churn itself to the reader. It is no great merit in a churn to produce butter very rapidly, for this is done at the expense of the quality and grain. The main things to be looked for are complete absence of buttermilk in the butter and ease in working the churn. As the butter is produced rather by impact (striking or dashing) than by mere agitation, the churn which will give the most effective impact, without injuring the grain of the butter, must be considered the best. It seems that these conditions are perfectly secured in a right-angled box churn, as Fig. 1. All the agitation which can be got in any other form of the churn is secured in this, while the concussion or impact on the right-angled sides or corners is greater and more direct than any other. The butter, too, comes as rapidly as it is advisable to have it. The form of churn most commonly used in small dairies is the upright or dash churn. Another variety is the cylinder churn, which is simply constructed and can be easily cleaned.

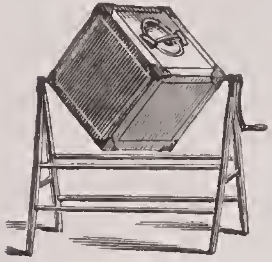


FIG. 1.—*Rectangular Churn.*

The Davis swing churn is very easy to work, and very simple in its construction. The opening into the box is always right side up, the lid is ventilated, and there is no slopping or dripping of cream. Each churn has a glass indicator in the cover, thus enabling a person to tell when the butter comes without raising the lid. The butter comes in beautiful granules in the most desirable form for washing with cold water or brine.

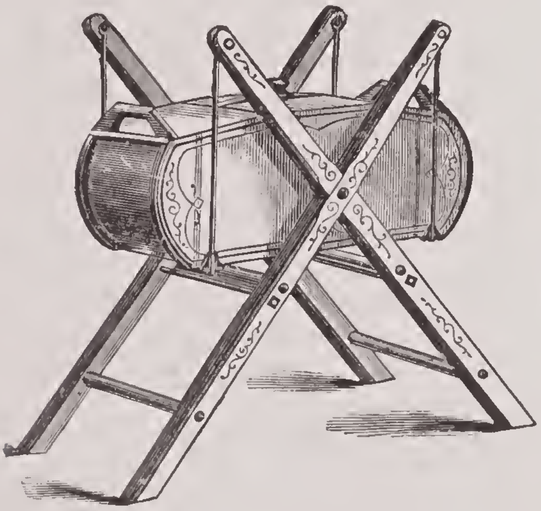


FIG. 2.—*Davis Swing Churn.*

The "Boss" Churn. These churns have become very popular among the dairymen and creameries of the West. They are simple, strongly made, and the opening at the top is so large that every part of them can be examined and thoroughly cleaned. Butter churned in a box churn or barrel churn without inside breaks comes in much better condition than in any churn with inside dash, and this class of churn is rapidly supplanting many others among dairymen.

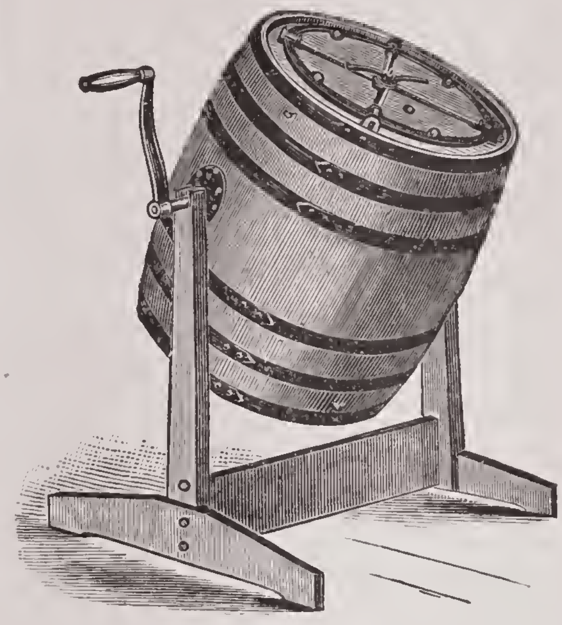


FIG. 3.—*The "Boss" Churn.*

The improved Union Churn is represented by Fig. 4. It is made with a heavy stave bottom supported by strong hoops, with patent adjustable fastenings, ventilating cover, thermometer for testing the temperature of cream, gear-wheels to increase the motion of the double-acting dasher, which creates four distinct counter currents of cream at every revolution. The inside irons are all tinned to prevent rusting, and the churn has no projections inside, being easy to clean. For strength, durability, neatness, adjustability, ease of operating and rapid and thorough work, it ranks high.

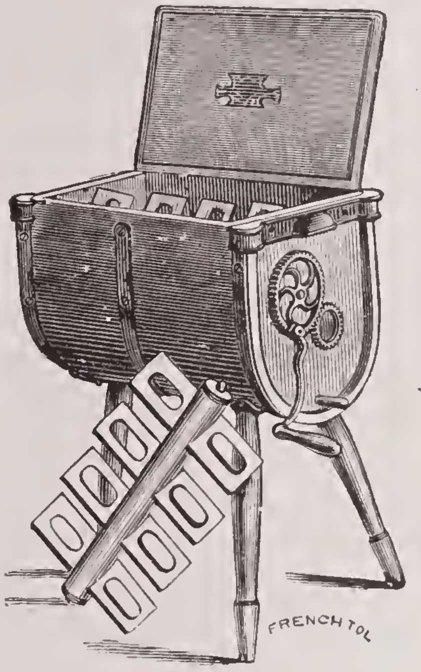


FIG. 4.—*Improved Union Churn.*

The churn represented by Fig. 5 is the I. X. L. Churn, which is an improvement on the old barrel or cylinder churn. It has a four-winged dasher, which folds together to be taken out. It is convenient to manage, and very durable.

Red Jacket Churn, which is nothing more than the old dasher churn, with a frame and gear to run it with, is represented by Fig. 6. This is perhaps the most successful attempt yet made to run the old dasher churn with machinery.

A good home-made churn can easily be made from a good, water-tight cask or barrel. Nail some cleats and lateral braces on the inside. The cover is held in place by a bar screwed loosely at one end to the head of the churn, the other end falling into a hook, after the cover is adjusted. This churn is then hung in a frame, a crank attached to it, and it is then ready for business.

Or, a good cask can have a cover fitted in the top and thus converted into a common dasher churn. As one can bring butter with a common dasher churn in less time than is necessary for the best quality of butter, there is really no great need of complicated apparatus where only small quantities of butter are required to be made, as with most families.

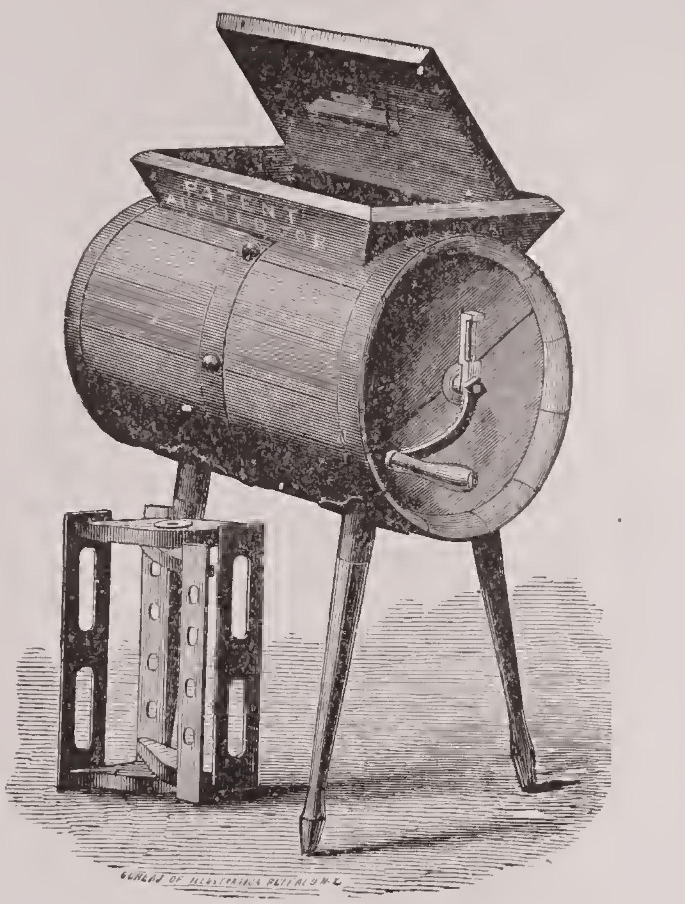


Fig. 5.—*I. X. L. Churn.*

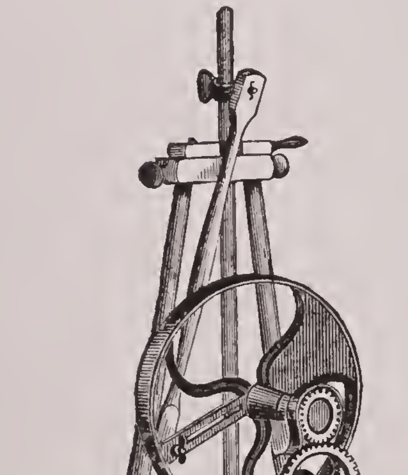


Fig. 6.—*Red Jacket Churn.*

Very neat, easy-running dog-powers (Fig. 7) are in the market, for running any light churn. Although intended for dairy purposes, they can be made use of wherever a light and portable power is desired. They are adapted for dash churns, and are also arranged with pulleys, or tumbling-rod and connections, for running crank or larger churns intended for power only. This power is supplied by Chas. P. Willard & Co., Chicago.

To keep a churn from frothing, take the body of the churn and cut a groove around the inside of the mouth, about three inches from the top and three-eighths of an inch deep, and then remove half the thickness of the wood, making a shoulder all around: then take the cover and cut it to fit accurately inside. Cloths, tubs, pans, etc., previously necessary to prevent the cream from flowing over, may now be dispensed with.

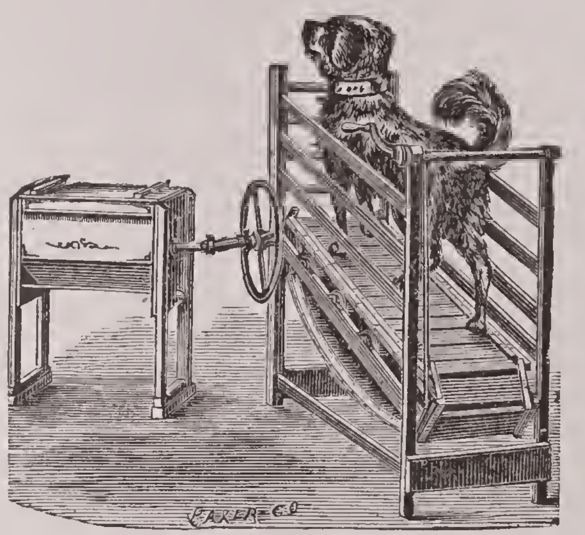


Fig. 7.—*Dog-Power.*

Churning: see under head of Butter.

Cider. "A drink made from the juice of apples." "The word is now appropriated to the juice of apples, before and after fermentation."—*Webster.* "A fermented liquor made from the juice of apples."—*Worcester.* It might prevent controversy among temperance people if they would abandon this ambiguous term, and substitute in their total abstinence pledges the phrase, "the fermented juice of fruits," or "any liquor containing alcohol."

For good cider, the apples should be allowed to hang on the trees as long as the wind and frost will permit them, and then picked by hand. The riper the apples the better the cider. They are then picked up and placed in large heaps, either in the orchard or at the cider mill, and are allowed to lie a few days to complete the ripening process, in which the starch is converted into sugar. Any that are bruised or rotten should be put in a heap by themselves, for an inferior cider with which to make vinegar. The apples are then rasped or ground into pulp. If the weather is cool or the apples not fully ripe, it is better to let the pulp remain in the vat a few days before pressing out the juice. This gives the cider a higher color, makes it sweeter and of better flavor. The process of pressing the apples is simple, but requires some skill. Four boards about six inches wide are nailed together in a square, the size it is desired to make the cheese, say from four to five feet each way. This is placed on the floor of the press, and a little clean rye or wheat straw is placed around the inside, with the ends extending some distance outside of the frame. A layer of pulp, say six inches deep, is then placed on the straw; the straw is then turned over on it, and a little pulp placed on the straw to keep it down. The rim is then lifted and a stick is placed on each corner of the layer of pulp added, and the straw turned over it as before. This process is repeated until the cheese is as large as desired, using say from 75 to 100 bushels of apples. When they can be obtained, use hair cloths instead of straw, to place between the layers of pomace. The straw, when heated, gives a disagreeable taste to the cider.

The pressing of the pulp, which is the next step in making cider, should be very gradual at first, else the pulp will burst out at the sides. But almost every one who undertakes to make cider at all is able to have a regular press or mill, manufactured on scientific principles, such, for example, as those illustrated in the annexed cuts.

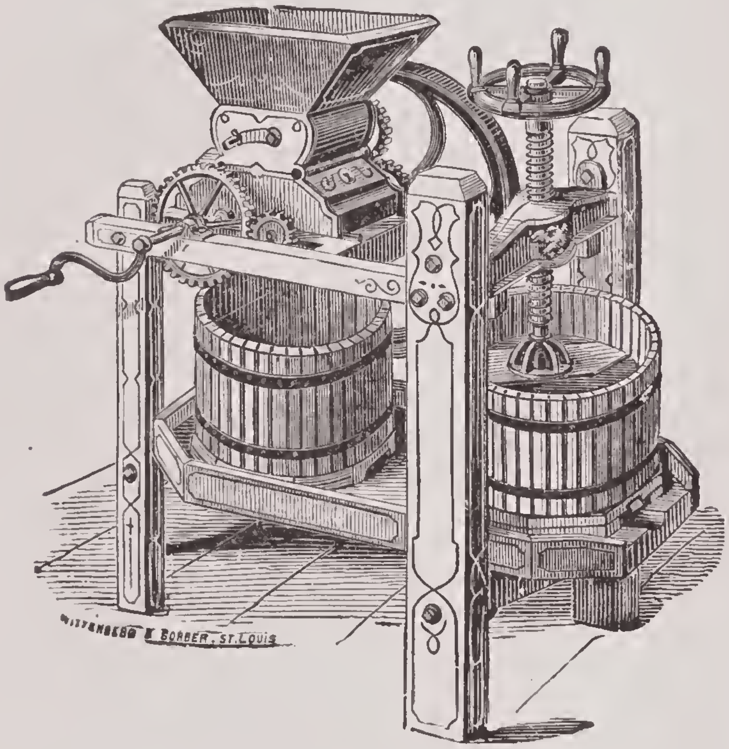


FIG. 1.—*Cider Mill, the "Americus."*

In the Americus the lower rollers run at the same speed as the upper, mashing perfectly. All mills should be left clean after using. The hopper of this mill can be removed in an instant for cleaning the mill after grinding. The lower rollers being adjustable, the mill can be set to mash grapes for wine without breaking the seeds.

Ragan's cider press is very compact, of immense power, weighs only 950 pounds, is portable, and can be removed from orchard to orchard in a regular two-horse wagon. It is 6⅓ feet high, 4¾ feet wide, and the platform is 6½ feet long. It can also be operated by horse or steam power, in which case a tight and loose pulley is placed where the crank is now seen at the left side of press. The ground apples are formed into cheeses by means of cloths made of coffee sacks or other suitable material, and said cheeses are formed by the open-ended square shapers, of which there are five. By raising loose pinion, which meshes with large wheel, you have a quick return motion. Parties owning portable engines can use them to great advantage after harvest by engaging in the cider-making business; it will pay large profit. Farmers may bring their apples eight to ten miles to make cider of them, as they thus get at least 25 per cent. more cider than they would by using the small hand mills.

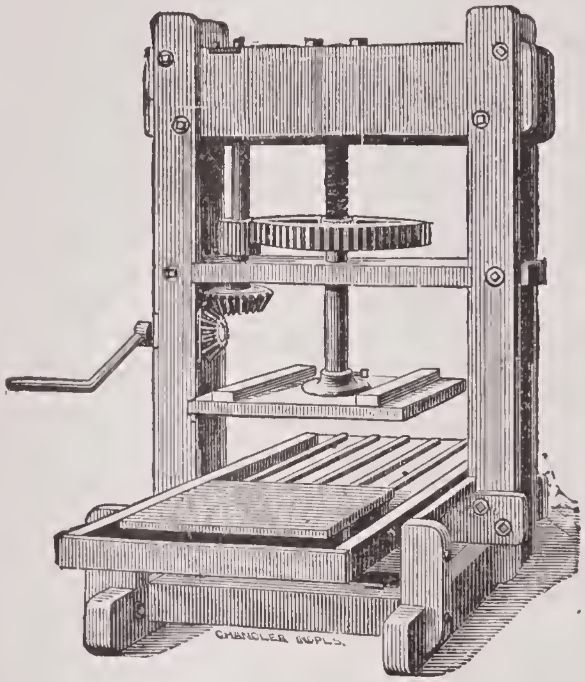

CHANDLER MPLS.

FIG. 2.—*Ragan's Cider Press.*

As the "sweet cider" runs from the press, let it pass through a hair sieve into a large open vessel, that will hold as much juice as can be expressed in one day. The cheese is generally allowed to remain under the press all night, and before leaving it in the evening the screw is turned as tight as possible. In the morning additional pressure is again applied. When the juice ceases to flow the screw is turned back, the boards taken off, and the corners of the cheese are cut off with a hay-knife and the pomace laid on the top. The pressure is now renewed, and the cider flows again for a time. Then remove the pressure, cut off and place on top as before four or five inches from the sides of the cheese, and the cider will flow once more. Eight bushels of good apples, in this manner, will make one barrel of cider. When little white bubbles break through the pomace, which will soon rise to the top, draw off the liquor by a spigot placed about three inches from the bottom, so that the lees may be left quietly behind. In this form of sweet cider it is a mild and pleasant beverage, which is not intoxicating. By another method the juice is placed in large, open tubs, and kept at a temperature of about 60°. After two or three days for weak cider, and eight or ten days for strong cider, or as soon as the sediment has subsided, the liquor is racked off into clean casks. The casks are then stored in a cellar, shaded barn, or other cool place, where a low and regular temperature can be insured, and are left to mature and ripen until the following spring, when it may be re-racked for use. The refuse pulp is an acceptable food for pigs and neat cattle.

If it is desired to keep the cider sweet for a long time, any one of several methods may be adopted. First, let it stand in open casks or barrels, and put into each barrel about one pint each of hickory (if you have them; if not, other hard-wood) ashes and fresh slaked lime; stir the ashes and lime first into one quart of new milk; then stir into the cider. It will cause all the pomace to rise to the surface, from which you can skim it as it rises; or you can let it remain about ten hours, then draw off by a faucet near the bottom, through a strainer, to avoid the hardened pomace. Then a handful of powdered clay may be put into the barrel, or two or three pounds of well burnt charcoal. Others add a little mustard seed, from one to two gills for each barrel. Sometimes a few gallons of cider are placed in the barrel, and a rag saturated with brimstone is attached to the inner end of a long tapering bung; this is ignited and the bung loosely inserted. After the brimstone is consumed, the barrel is rolled until the cider has absorbed the sulphurous acid gas. The barrel is then filled up with cider. The sulphurous acid arrests fermentation. The objection to this method is that if too much gas is absorbed, it may prove unpleasant, and it may prove injurious in any case. To obviate this objection sulphite of lime is now used, which has the property of arresting fermentation, making the cider perfectly clear, and imparting an agreeable taste. One-fourth of an ounce of sulphite is added for each gallon of cider. The sulphite should first be dissolved in a quart or so of cider before introducing it into the barrel. Agitate briskly for a few moments, and then let the cider settle. The fermentation will cease at once. If loosely corked, or kept in a barrel on draught, it will retain its taste as a still cider. If preserved in bottles carefully corked it will become a sparkling cider, and may be kept indefinitely long.

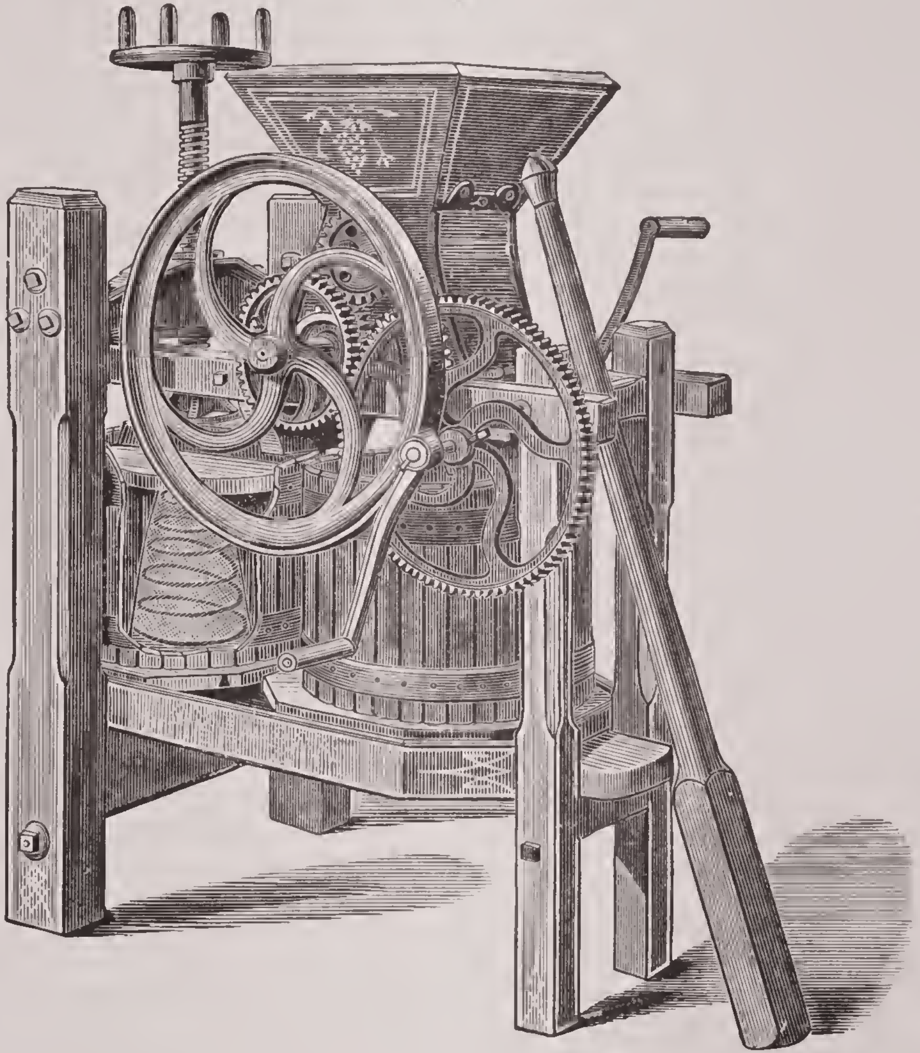


Fig. 3.—*The American Cider Mill.*

Whatever method may be adopted, the cider must be drawn off into very clean, sweet casks, and closely watched. The moment white bubbles are perceived rising at the bung-hole, rack it again. When the fermentation is completely at an end, fill up the cask with cider in all respects like that already contained in it, and bung it up tight. The most perfect plan for excluding all action of the air from the surface of the cider, and preserving it sweet, is the addition of a tumbler of sweet oil before finally closing up the bung-hole. It is not an easy matter to keep cider sweet and pure for any length of time, especially if the weather is warm. If the cider is not made until just before winter sets in, and can afterwards be kept at or near the freezing point, it will remain sweet and excellent.

The mill, Fig. 3, is constructed on an entirely different principle from other cider mills, which either grate or cut the apples, leaving the larger portion of the pomace in lumps, from which the juice cannot be extracted by the press. in this mill the two lower rollers are cast with alternate ribs and grooves, interlocking to draw in the apples, and the fruit is mashed between the smooth segments, breaking thoroughly all the cells, so that the cider is thoroughly extracted in the press.

To make good fermented cider, that will keep a year or more without turning too sour to be used for anything but vinegar, is not a difficult matter. The first thing is to exclude all decayed fruit, but it should be quite ripe. The sweeter the juice, the stronger the cider, and the better it will keep. Put the barrel immediately in a cool cellar, the cooler the better. The fermentation may go on slowly or rapidly, practice differing in this respect. In the former case the liquid is treated the same as wine. In the bung there is fixed, air tight, a metal tube bent at right angles, or a piece of india rubber tube. In either case the free end of the tube dips into a vessel of water.

This arrangement allows the gases liberated in fermentation to pass out, and the end of the tube being covered with water, air cannot pass in. The bubbling of the gas through the water shows how the fermentation is progressing. When this has ceased the cider is racked off into clean casks, which are to be full and bunged tightly. The importance of keeping the cider in a cool place is too often overlooked. The temperature should not exceed 50°. When exposed to the full heat of autumn, much of the alcohol is converted into vinegar, by the absorption of atmospheric oxygen.

Another process is as follows: After obtaining the juice as already directed, strain it through a coarse hair sieve into open vats or close casks. When the liquor has undergone the proper fermentation in these close vessels, which may be best effected in a temperature of from 40° to 55° F., and which may be known by its appearing tolerably clear, and having a vinous sharpness upon the tongue, any further fermentation must be stopped by racking oft the pure part into open vessels, exposed for a day or two in a cool situation. After this the liquor must again be put into casks and left in a cool place during winter. The proper time for racking may always be known by the brightness of the liquor, the discharge of the fixed air, and the appearance of a thick crust formed of fragments of the reduced pulp. The liquor should always be racked off anew as often as a hissing noise is heard, or as it extinguishes a lighted match held to the bung-hole. When a favorable vinous fermentation has been obtained, nothing more is required than to fill up the vessels every two or three weeks, to supply the waste by fermentation. By the beginning of March the liquor will be bright and pure, and fit for final racking, which should be done in fair weather. When the bottles are filled they should be set by, uncorked, till morning, when the corks must be driven in tightly, secured by wire or twine and melted resin, or any similar substance.

Cider should never be put into new casks without previously scalding with salt water, or with water in which pomace has been boiled. Beer casks should never be used for cider. Wine and brandy casks will keep cider well, if the tartar adhering to their sides is first carefully scraped off and the casks are well scalded. Burning a little sulphur in a cask will effectually remove must. Cider may be preserved for years by canning it air-tight, as fruit is canned. To cleanse old casks, take lime water and a trace chain and put them in the barrel through the bung-hole, first fastening a strong twine to the chain to draw it out with. Then shake the barrel about until the chain wears or scours off all mold or pomace remaining in the barrel. Then rinse well with water; after throwing out the rinsing water put in a little whisky, turning the barrel to bring it in contact with every part, and pour out all that will run out. To clarify cider, to one hogshead add one and a half gallons of brandy or rum, two ounces powdered catechu (dissolved in water), seven pounds moist sugar or honey, four ounces mustard seed, one-half ounce bitter almonds, and one-half ounce cloves. These must be well stirred in, and occasionally stirred up for a fortnight, after which it must be allowed to repose for three or four months, when it will usually be found as bright as wine. Should this not be the case, it must be fined with a pint of isinglass finings or a dozen eggs, and in two weeks more it will be fit for use. If the cider be preferred pale, omit the catechu, and instead of the isinglass, fine with one quart of skimmed milk. If wanted of a light reddish or rose tint, use one-half ounce cochineal and omit the catechu.

Preparatory to bottling cider, it should be clarified until it is clear and sparkling. The bung should be left out of the cask the night before the cider is bottled. The bottles themselves should be left unclosed the next night, else some will burst. The corks should be of good quality, and be covered with tin foil, as with champagne. When the cider is wanted for immediate use, or for consumption during the cooler season of the year, a small piece of lump sugar may be put into each bottle before corking it. When intended for keeping, it should be stored in a cool cellar, when the quality will be greatly improved by age.

CHAMPAGNE CIDER is made by mixing in one hogshead cider 3 gallons spirit and 20 pounds sugar or honey. Let it rest for two weeks, then fine with two quarts skimmed milk. This is very pale, and a similar article, bottled in champagne bottles, and silvered and labeled, has often been sold to the ignorant for champagne. It opens very brisk if managed properly.

IMITATION CHAMPAGNE is made by putting a teaspoonful of carbonate of soda, two teaspoonfuls fine sugar, and a tablespoonful brandy in a tumbler and filling up with sharp cider.

IMITATION CIDER is made by the use of the following recipe: 25 gallons soft water; 2 pounds tartaric acid; 25 pounds New Orleans sugar; 1 pint yeast. Put all the ingredients into a clean cask and stir them up well after standing 24 hours with the bung out. Then bung the cask up tight, adding 3 gallons spirit, and let it stand 48 hours, when it will be ready for use.

SWEET CIDER may be imitated as follows: Take 100 gallons water; 5 gallons honey; 3 ounces powdered catechu; five ounces alum; one quart yeast. Ferment for 15 days in a warm place in the sun, if possible; then add bitter almonds, half pound; cloves, half pound; burnt sugar, one quart; whisky, three gallons. If acid be in excess, correct with honey or sugar. If too sweet, add cider vinegar to suit the taste.

A cheap imitation is made by the usual ingredients, and sulphuric acid to give it "body." This is not near so good as to ferment.

Cinchona (sin-ko'na), Peruvian or Jesuit bark. There are several barks of cinchona, used in medicine, and from which "quinine," or the sulphate of quinia, is made. Cinchona, or its barks, are not used in horse and cattle diseases. Quinine is the only preparation used; but its high price is against its use in veterinary practice. Among valuable horses, it is frequently used to hasten recovery from influenza, lung fever, etc.

DOSE. Twenty to 40 grains, repeated from three to four times a day. Quinine is apt to be adulterated with arsenic, as proved to be the case with many samples used in the late war.

Cinnamon. Ground cinnamon is frequently adulterated with cassia bark, which may be distinguished, before being ground, by its greater thickness, its breaking without splintering, and its redder color and bitter taste. Sometimes, indeed, the ground article is all cassia, and sometimes it consists in great part of other ingredients, as starch or saw-dust.

Circular Work, TO MEASURE: see Measurements.

Cistern. Every farmer should have a cistern. Soft water is needed by the wife not only in washing, but for a hundred different purposes. The quantity of rain-water falling on roofs in a year is commonly much under-estimated. Three feet of rain per annum, the average quantity, gives 72 barrels for each space of 10 feet square; a barn 30 by 60 feet yields from its roof each year 650 hogsheads of rain-water, most of which is wasted. In building the cistern, have the walls below the reach of the frost. To supply an ordinary family, it should be at least ten feet deep and four in diameter. Of course, in very wet ground, or where hard rock is in the way, the cistern has to be broader and shallower. It should be walled up with brick or stone (brick is the best), and well cemented with the following: Take equal parts of quicklime, pulverized baked bricks and wood ashes, thoroughly mixed and diluted with sufficient linseed oil to make a paste. It immediately hardens and never cracks beneath the water. A cheaper cement, however, and about as good, is a mixture of two parts of Louisville or Rosendale cement with one part of sand.

To smooth the surface, brush it over with a white-wash brush dipped in clear water, thus closing up all the openings that may have been left by the trowel; when sufficiently hardened, white-wash it with clear cement and water. This forms a glazed surface like earthenware.

For filtering, build a partition wall, curving to the side where the water runs in, curve to be one inch to the foot; make the dividing wall double, two feet high and one foot wide; this space fill with finely pulverized charcoal and sand, two parts charcoal one part sand. Of course the partition wall does not need cementing. Another plan is to dig two cisterns and filter the water from one to the other by means of a pipe filled with charcoal and sand. To rectify impure water in the cistern, put in two ounces of permanganate of potash to each 25 barrels of water.

To calculate exactly the capacity of a jug-shaped cistern requires more nice figuring than most persons care to undertake. The contents of any cistern can be easily approximated by the use of the following table, calculated for a cistern of uniform diameter from top to bottom, for each ten inches of depth:

DIAMETER IN FEET.	NO. OF GALLONS.	NO. OF BARRELS.
2	19	2/3
2½	30	1
3	44	1 3/8
3½	60	2
4	78	2½
4½	97	3 1/8
5	122	3 7/8
5½	148	4 2/3
6	176	5 3-5
6½	207	6½
7	240	7 5/8
8	313	10
9	396	12½
10	489	15½
11	592	18¾
12	705	22¾
15	1101	33 1/3
20	1958	62

Thus, a cistern seven feet in diameter and ten feet deep, would contain 7 5/8 x 12, or 91½ barrels. (Ten feet is 12 times ten inches). A cistern gradually increasing or decreasing in diameter can be estimated by sections, taking, for example, every ten inches, which will render it easy to work by the above table.

Citric Acid, the acid of lemons and limes, which are fruits of the citron family. The acid, as concentrated, is a crude poison, but diluted, it has of course the same properties as lemon juice. To be of the average strength of lemon juice, the acid is dissolved in the proportion of 18 drachms to the pint of water.

Citron, the fruit of the citron tree, which is of the same family with lemons, limes and oranges, and grows in warm countries; also the name of a species of watermelon, globular in form and symmetrically striped and used only in preserves; also, of late, a name of the cantaloupe or nutmeg muskmelon. In both the latter senses the word is unauthorized according to Webster's dictionary. The cultivation of the citron watermelon is the same as that of any other species of watermelon.

Candied citron, such as is used for fruit cake, can be prepared from the above at far less cost than to buy the imported. If the citrons are small, divide them lengthwise into eighths; if large ones, divide again; pare off the rind and pick out the seeds carefully, then drop the slices into boiling syrup—maple syrup is best, but syrup made from clarified sugar will do; use syrup enough to cover the pieces, cook slowly until the syrup is nearly boiled down, then place the pieces on plates to dry; dip the thickened syrup over the pieces, and then dry them in the stove oven, being careful to watch them closely so they will not scorch. After all the syrup has been dried in and the citron candied down, place it in glass jars for future use. Use, the same as imported citron.

City. For information in reference to seeing the sights of a city, the things and persons to be avoided, caution, advice, and the general rules to be observed by the farmer in visiting the city, we refer the reader to the article on Traveling.

Cives or **Chives,** a hardy species of onion, of easy culture. It is propagated by tearing to pieces the old clumps and setting the divisions in rows a foot apart. Not cultivated as much as formerly.

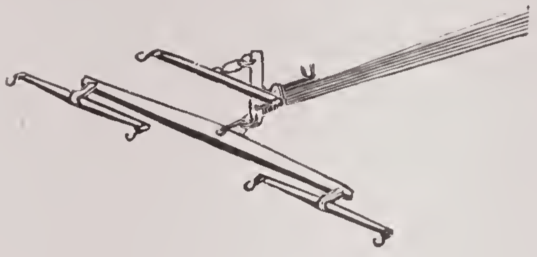
Clabber, bonnyclabber, or loppered milk; milk which has soured and become coagulated, or thickened.

Clay, a soft earth, which is plastic, or may be molded with the hands, and consists of alumina, silica and water. It originates from several species of rock, worn down very fine. Lime, magnesia, oxide of iron and other ingredients are generally present. One of the purest kinds of clay is decomposed from granite; and that which comes from feldspar, one element of granite, is the "porcelain" clay. "Potter's" clay is a tolerably pure kind, free from iron. "Brick" clay contains some iron, on which account it turns red when burned. Clay for fire-brick is entirely free from lime, iron or any alkali, and will not therefore glaze in burning. "Fatty" clays are those which feel greasy. "Clay loam" contains 15 to 20 per cent. of sand, while "loamy" clay contains 30 to 60 per cent. Pure clay is infertile, but it forms the body of all fertile soils. In the West the clay underneath the black humus or soil is yellow, and averages about 20 feet in depth; underneath this is another black soil, which was once the surface of the earth; and underneath the latter again is a body of "blue clay," very compact and sticky, requiring picks in digging it.

Clay, being gradually heated, parts with its water and diminishes in bulk without cracking. Heated to redness, it forms a solid msss, which retains its form even if placed, when cool, in water and allowed to absorb this into its pores. Free from foreign substances, it bears the most intense furnace-heat without melting and is hence well suited for the manufacture of crucibles and fire-brick.

Cleaning: see article to be cleaned.

Clevis, a U-shaped piece of iron for hitching a whiffle-tree to a plow, harrow or cultivator. A "dial" clevis is one on the forward end of the beam of a breaking plow, arranged on a dial-plate piece of iron for gauging the plow to the land. The three-horse clevis is illustrated in the annexed engraving, also one style of three-horse whiffletrees. See **Whiffletree.** It will be noticed in the cut that the principle is to give the middle horse twice as much leverage in the clevis as is given the other two horses combined, so that the draft may come equally upon the three.



Three-Horse Clevis.

Climate. Climate affects the agriculturist so far as the product of the soil is concerned, in an important degree; heat, rainfall, humidity, air currents, all operating for or against the fertility of the soil. The principal points collected from a variety of sources, as relating to the United States generally, are summed up as follows: The climate of the United States is a peculiar one. Most of it lies within the dry belt of the trade-winds, which, in our summers, make the dryness of the California climate and of New Mexico, where the corn crop is dependent on irrigation. There are two of these dry belts, one on each side of the equator, and their dry winds blow diagonally into each other, producing by their mutual action a belt of rain about 500 miles in width under the equator, and directly under the sun. These winds are concentrated by the lofty range of mountains in South America and Mexico, and turned northwards, carrying with them this belt of rains. In our summer they extend west as far as the middle of Texas; thence north, through the middle of Kansas; they curve gradually eastward and pass to the Atlantic by the line of the great northern lakes, covering all the old States with the rains from this equatorial belt; extending no further west than the middle of Texas and Kansas, they leave the western portions of them to the dry California climate. These rains, from causes not yet fully ascertained by science, are irregular as to time, quantity and duration. In the spring they are more concentrated, giving us the heavy, beating rains of March and April, and in July and August they cease almost entirely. We have no rains from the evaporations of our country; these we see in the form of dew only, or, at most, they but slightly increase the amount of our equatorial rains. From this source of our rains results the extremes so peculiar to the American climate. At one time our plowed lands are saturated with water, our clay soils are melted, and, in drying out, are compacted, so as to be much harder than the frosts left them in spring, before they were broken up. Then quickly follow droughts, parching and baking the soil, making it unfit, if worn, for profitable production. These influences of the climate so act upon the soil that the standing topics of our agricultural writers are drainage, thorough plowing and constant stirring of the soil.

Nearly all the rain of California falls between November and June. The annual fall of rain in that State is about 22 inches, decreasing southward to the Colorado desert, where it is almost nothing. In the northern part of the State, and on the western slope of the Sierra Nevada, the range is stated at 35 inches per annum. The general average is about that of half the States east of the Mississippi. This average increases northward. At Humboldt it is about 45 inches, and at Vancouver's Island about 65 inches per annum. At Port Townshend, on Puget Sound, the distinction between the wet and the dry season is practically obliterated, the fall of rain being distributed throughout the year. On Sitka Island it becomes excessive, the mean annual deposit being 89.90 inches. Coming now to the climate of the West and Northwest, east of the meridian near which Omaha is situated, we find a climate often intensely cold or at least variable in winter, but with plenty of rainfall, equably distributed, and with summers of strong heat so the grape may be ripened well up to and even in Minnesota. So the more prolific varieties of Dent corn thrive as nowhere else in the world; also all cereal grains, sweet potatoes, tomatoes, egg plant, pepper, melons, and many other tropical and sub-tropical annuals. As a fruit-growing region the prairie districts are not especially adapted thereto, yet with a little care many varieties adapted to the climate may be raised, and the timber districts are unsurpassed in the production of fruit, the peach and sweet cherries flourishing on the east shore of Lake Michigan, nearly to 45° north latitude. West of Omaha the climate becomes dryer and dryer until passing the hundredth meridian, or the central part of Kansas, the climate becomes too dry in summer for general agriculture, or the successful cultivation of fruit and the cereal crops without irrigation, but is eminently adapted to pasturage. Further north there is more rain, so that, in the latitude of Minnesota, cereal crops may be raised in the valleys through to the Pacific coast.

The nature of the vegetation covering the earth varies, as we have remarked, according to the climate and locality; and plants are fitted for different kinds of soils, as well as for different amounts of temperature, light and moisture. From the poles to the equator this constant variation in the nature of the flora is a shifting scene, passing from the lichens and mosses (the lowest vegetable forms in the arctic and antarctic regions) to the noble palms, bananas, and orchids of the tropics by a series of regulated changes through all the multiform aspects of the vegetable kingdom. The same progress and graduated fitness is observed in the vegetation of lofty mountains under the equator, when descending from the summit to the base. From the scanty vegetation of Greenland, where the only woody plants are the arctic willows, trees scarcely a finger-length in height, we may trace the expansion of vegetation as we move southward over the lichens and mosses to the saxifrages and cruciferous plants, those resembling the cabbage and turnip in their mode of flowering; then to grassy pastures, and by coniferous or fir-like trees, and amentaceous or birch and alder-like trees, to the northern borders of the United States. Extending our glance further southward we shall perceive that we enter the region of oaks, hickory and ash, of tulip (Liriodendron), cottonwood, buttonwood, walnut, red and white cedars, sugar and other maples, sassafras, sumac, laurel, and many other trees and shrubs of the temperate regions of North America. In the districts further south we find an increase both of species and of genera, and more tropical forms show themselves, such as magnolia, Osage orange, honey locust, cypress, holly, bay, wax myrtle, the cotton plant, rice, the live oak, and enter the borders of the regions of the palmetto and the orange; thence to those of the sugar-cane and pine-apple, the coffee plant and the cocoanut, and the luxuriant vegetation of the equator and torrid heats. In this progress, as Humboldt, the father of geographical botany, remarks, we find organic life and vigor gradually augmenting with the increase of temperature. The number of species continues to increase as we approach the equator, and each zone presents its own peculiar features: the tropics their variety and grandeur of vegetable forms; the north its meadows and green pastures, its evergreen firs and pines, and the periodical awakening of nature in the spring-time of the year. Many causes intimately connected with the aspects of our globe have an influence in modifying the conditions of climate, and thus affecting the distribution of animals and plants on its surface. The geographical forms of contour, the relief or elevation and depression of the terrestrial surface, the relations of size, extent, and position, each exert a very marked effect upon the climatic peculiarities of a district. The bearing or direction of the shores of a continent, the elevation of a mountain in one place rather than in another, the subdivision of a continent into islands or peninsulas, and other minor differences, have very important bearings upon the climate of a district. The depression of a few hundred feet over some wide areas would reduce some regions to the level of the sea, or sink them beneath its waves, or so modify the climate of the higher portions left above the waters as to render them no longer tenable by the life that once enjoyed a congenial clime. This is shown by the observation that some low islands scattered in clusters are covered with a vegetation entirely different from that of extensive plains, though lying in the same latitude. A change in the bearing of the shores would modify the currents of the ocean, which would react upon vegetation. Mountain-chains have oftentimes an influence upon the prevailing winds, and their height, or the plateaus from which they arise, modify the climate, and render it temperate or arctic under the fervent heats of the torrid zone. A mountain-chain extending from east to west may form a barrier between the colder regions on the north and the warmer on the south, and thus protect the northern plains from the warmer winds of more temperate regions, and increase the heat on the southern slope. This is exemplified by the Alps of Switzerland, which reduce the temperature of Germany below the mean that would otherwise prevail but for their cooling influence. Under some of the high towers of this mountain-barrier against the assaults of winter, the palm, the pomegranate, the orange and the olive grow, in the open air, while a few miles to the eastward, in valleys open to the north, through which the hurricane-blasts of the Borra rush with terrific force and severity of cold, often sweeping vessels from anchorage, these more tender plants cannot exist. A few thousand feet in elevation, which is insignificant compared with the mass of the earth, changes entirely the aspect and the character of a country. For evidence of this assertion we may compare the burning region of Vera Cruz—its tropical productions and its fatal fevers—with the lofty plains of Mexico, their temperate growths and perennial spring, or the immense forests of the Amazon, where vegetation puts forth all its splendors, and where animal life is abundantly prolific, with the desolate paramos or Alpine regions of the summits of the Andes, rude, ungenial and misty.

The climate that would result from latitude alone is greatly modified by the presence or absence of extended sheets of water; and the distribution of heat through the year, for any place whatever, depends essentially on its proximity to, or its distance from, the ocean or large lakes, and the relative frequency of the winds that blow over them. The equalizing influence of large bodies of water, the temperature of which is less liable to sudden changes than the atmospheric air, is quite apparent.

Knowing as we do how much local influences, as supply of moisture, currents of air, elevation, capacity of soil for absorbing and holding heat and moisture, and the various other conditions that may be seen by every observing person, alter the range of production in localities, we have the key to many of the difficulties in the cultivation of crops, and thus may easily see why certain plants may be hardy and prolific in one locality and yet impossible to be successfully cultivated in another, not far distant. For instance, the peach is at home in Western Michigan, near the lake shore, while in Illinois, not more than 40 miles west, it can not be raised at all. The climate of that State, modified by the unfathomable depths of Lake Michigan, is cooler in summer and warmer in winter, and they escape spring frosts, prevalent in Illinois in the same latitude.

Clingstone, a peach the flesh of which clings to the stone.

Clipping of Horses. The clipping or shortening of the hair of the horse, in winter, is as vicious as it is distressing to the animal, unless in the case of horses used for fast driving, and which, both in and out of the stable, receive the very best of attention and clothing. So the clipping of the long hair about the lower limbs and fetlock should never be allowed except the horse be kept out of cold drafts, when standing, and also is thoroughly washed and dried, by rubbing, when brought into the stable. See article on Horse for directions as to how clipping should be done.

Clocks are indispensable at the farm-house; meals must be ready on time; farm hands must be wakened early in the morning; and a thousand things require its presence. The best kind for a farmer is an eight-day alarm. A pendulum clock run with weights, although not so portable, keeps time more evenly than spring clocks, which run a little too fast when wound up and too slow when nearly run down. In setting up a clock great care should be taken that the pendulum rod swings easy, that is, that the thin portion works squarely back and forth and not with a warping jerk. In setting the time, it is customary in the country to call it 12 o'clock when the sun is on the meridian as shown by the noon mark; but the sun generally varies from true clock time, sometimes as much as a quarter of an hour. A good almanac indicates the variation for each day in the year. Those living near railroads generally keep "railroad" time, which is of course more satisfactory. In winding up a clock, be careful not to shake it much, and always keep the clock door closed when not winding or repairing, in order to keep out all dust.

Closet (cloz'et), literally, a closed place; in general, a small room for private retirement; also, a case for containing clothes, articles of furniture, curiosities, etc. The various closets are named with reference to the use made of them, as "clothes" closet, "water" closet, etc. These "closed" places are, of all places in the house, the best calculated to hold confined air, and are therefore universal sources of malaria. It requires some trouble to ventilate them frequently as they should be, at some seasons of the year almost or quite every day. But all closets should be made self-ventilating in their original manufacture. Every domicile should also have a bath-room. Families of very limited means can cheaply construct a small room adjoining the back side of the cook stove, in such a way that the stove will not only keep the room warm but furnish hot water, so that it may be ever convenient to take a comfortable bath. What is inconvenient to be done is generally neglected. See Residence and Privy.

Cloth, any woven fabric, of fibrous material, used for garments or other purposes. "Broadcloth" is a fine kind of woolen for men's garments, exceeding 29 inches in width, all woolens of less width being known as "narrow" cloths.

To revive the color of black cloth, first clean it well (see Laundry); boil two, three or four ounces of logwood half an hour; then dip the coat in warm water, wring it well, and boil it half an hour in the logwood water; take it out, dissolve in the logwood water a piece of copperas about the size of a small thimble, and in this solution boil the cloth another half hour; then draw it, hang it in the air an hour or two, rinse it in two or three cold waters, dry it, and brush it thoroughly with a soft brush over which a drop or two of olive oil has been rubbed, and finally stroke the cloth regularly all over. A cloth coat may be treated by this method.

To raise the nap on cloth, soak it in cold water half an hour, then put it on a board and rub the threadbare parts with a half-worn hatter's card filled with flocks, or with a prickly thistle, until a nap is raised. Hang up to dry, and with a hard brush lay the nap the right way. For other treatment of cloth, see Bleaching, Dyeing, Cement, Laundry and Waterproofing.

Clothes Line, Pins, Rack and **Wringer:** see Laundry.

Clothing: see Hygiene.

Cloud: see Weather.

Clover. The several clovers afford valuable provender for live stock. The most popular, in their order, are, the white, the red, lucern, Alsike, sainfoin, Bokhara, Southern, spurry, yellow, etc. The white so universally propagates itself that it is seldom cultivated. Along with blue-grass it is the most efficient herb in forming a dense mat under the feet of horses and cattle. The several varieties of white clover are peculiarly partial to clay lands having a rich vegetable mold upon the surface; and the addition of gypsum or salt will at all times give them great luxuriance. They are all too low for harvesting.

Fig. 1 represents the white clover. This is a valuable honey plant, especially in June. Its chaste and modest bloom betokens the beautiful, luscious and unrivaled sweets which are hidden in its corolla tube as a storehouse for the little bee to feast upon.

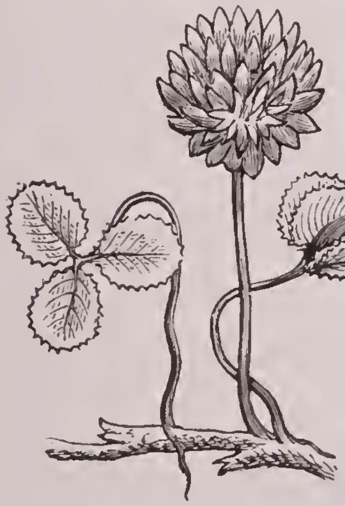


Fig. 1.—*White Clover.*

The common red or Northern clover, a biennial, is the best kind for cultivation and cutting. In Wisconsin the smaller variety is the best. It is very easy of cultivation, especially on limy soils, where sometimes it is indeed a triennial (lasting for three years). The seed may be sown broadcast either in August or September, but much better and surer in early spring, with most of the grains or the cultivated grasses; or it may profitably constitute a crop by itself. On well prepared loams, 10 to 12 pounds of good seed will frequently give a full covering to the land, while on clay 12 to 16 pounds are necessary to the acre. When sown with the grasses, four to six pounds on the first kind of soil are sufficient, and 8 to 12 pounds on the last. The more thickly sown, however, the finer the stems will be, and on that account a little better as provender. If sown on well pulverized ground, especially before a rain, it will germinate freely enough without being harrowed in. After the leaves are out in the spring, gypsum may be sown broadcast, at the rate of three to four bushels to the acre, where the land is at all favorable to its action. The effect is extraordinary. Bones are good manure for clover.

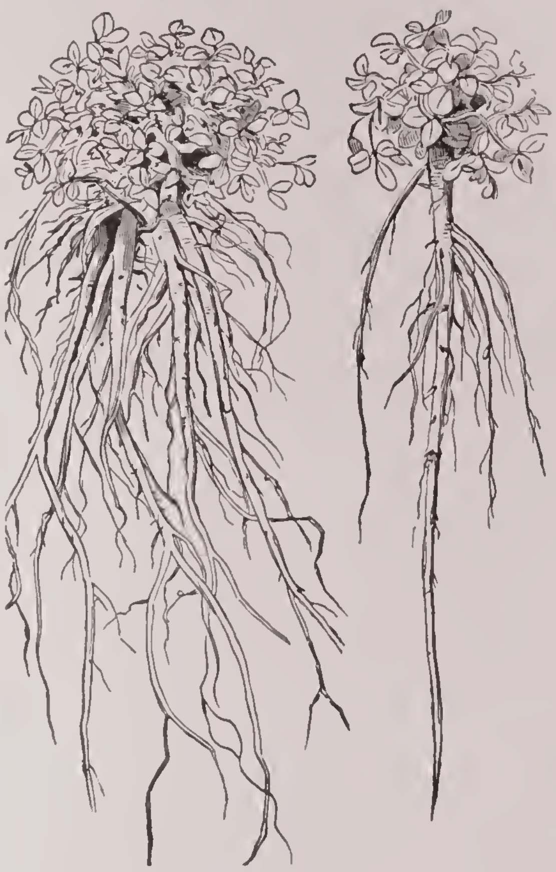


Fig. 2.—*Clover Roots.*

Fig. 2 shows how the roots go down deep into the earth, which they loosen, and whence they bring up, like gold miners, the treasures of the deep and deposit them near the surface of the ground for the use of other crops. Poor sandy soils may be made to sustain clover with manure, ashes and gypsum, combined with the free use of the roller. This object is much facilitated by scattering dry straw over the surface, which affords shade, increases the deposit of dew and prolongs its effects.

The value of clover for enriching and renewing land is almost incalculable. It is a common observation of intelligent farmers, that they are never at a loss to renovate such lands as will produce even a moderate crop of clover. Poor clay lands not capable of bearing this plant, have been made so capable by sowing an early and a late crop of oats in the same season and feeding them off on the ground.

Clover should be cut after having fully blossomed and assumed a brownish hue. By close cutting, more forage is secured, and the clover afterward springs up more rapidly and evenly. The swath, unless very heavy, ought never to be stirred open, but allowed to wilt on the top. It may then be carefully turned over, and when thus partially cured, placed in high, slender cocks and remain till sufficiently dry to stow away in the barn. Storage can be done while the clover is comparatively green if 10 to 20 quarts of salt per ton is evenly scattered over it in the mow. It is somewhat better, however, to place in alternate layers of dry grass, hay or straw, which will absorb much of the nutritious gases.

The second crop of clover may be either saved for seed, mown, pastured, or turned under for manure. The greatest benefit to the soil can be secured the second year, when the dried roots are in the proportion of 56 for every 100 pounds of clover hay produced from them in two years. This then is the proper time for plowing up the field and renewing again its accustomed round of crops. If desirable, clover may be imperfectly sustained on some soils for a few years by the use of gypsum, bone-dust, ashes, and other manures. In rare cases of upland meadow, clover has been known to keep well up for quite a number of years, but in such cases no seed crops must be taken from it. In wet lands the roots are often thrown out by "heaving" by frost of winter, in which case a tolerable crop may be secured by heavy rolling. Wet lands, for clover, should be under-drained.

Harvesting clover-seed may be done generally after taking off one crop, or pasturing the field till June, or at such time as experience shows to be the proper one for leaving it to mature a full crop of seed. Early mowing removes the first weeds, and the second growth of the clover is so rapid as to smother them. It is then mown and raked into very small cocks, and when dried at the top they are turned completely over without breaking. As soon as thoroughly dried they may be carried to the threshing-floor and the seeds beaten out with sticks, light flails or a "clover-huller."

A kind of horse-rake with closely set teeth can be used to advantage in collecting clover-heads from the standing stalks. For cropping at home, these heads can be sown without threshing. It is difficult to thresh clover until after it has fermented in heaps, to divide the little seed-pods.

Southern clover is smaller, does better on a light, thin soil, and matures 10 to 14 days earlier than the Northern red. Yellow clover, like the white, is spontaneous, prolific and hardy. Bokhara or sweet-scented clover is a tall, shrub-like plant, four to six feet high, with branches whose extremities bear numerous small flowers of great fragrance. When full grown it is too coarse for fodder, but if thick and cut young it yields a profusion of green or winter forage. It should be sown in the spring with about two pounds of seed per acre, in drills 16 to 20 inches apart; and must be kept clear of weeds. It requires a rich, mellow, loamy soil. But the extreme northern portion of the United States is rather too cold for it, as it is also for crimson clover and sainfoin.

Lucern is one of the most productive plants for forage ever cultivated. Compared with red clover it is inferior in quality, but considering its productiveness, it is in many places more valuable. It bears three to five crops a season, yielding three to eight tons of hay to each crop. It is hardy in the South; the Northern States are rather too cold for it. It requires a deep, dry, loamy soil, free from weeds and well filled with manure. A suitable crop to precede it is corn or potatoes, heavily manured and kept clean. Plow in the fall and add 40 bushels of crushed bones to the acre. Early in April, harrow thoroughly and sow in drills from one to two and a half feet apart, at the rate of eight or ten pounds of seed per acre. Stir the ground and extirpate the weeds with the cultivator or horse and hand hoe. It may be lightly cropped the first year, and more freely the second, but it does not attain full maturity till the third. Being a perennial, it requires no renewal. It should be cut before getting too heavy, and cured like clover. Liquid manure, gypsum and ashes are good for this plant. Barnyard manure, freed from weed-seeds, is occasionally needful. It is one of the most valuable plants for soiling.

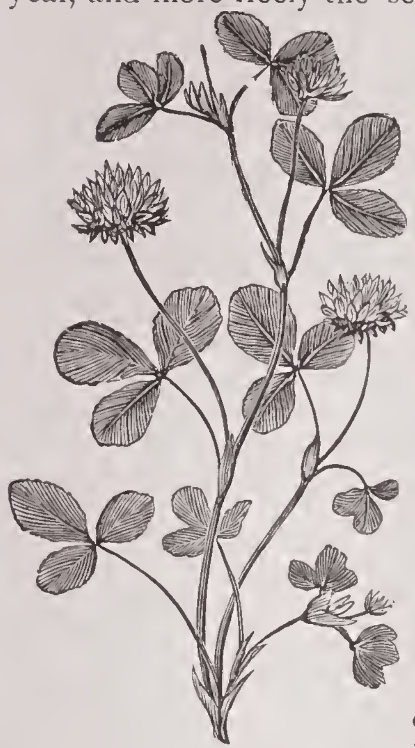


Fig. 3.—*Alsike Clover.*

Alsike (al-see′ ka), or Swedish clover (Fig 3.), seems to be very capricious in its productiveness in this country, succeeding well in some places and not at all in others. In moist ground, however, it succeeds better than red clover, growing to the average height of this plant and bearing white blossoms, and is probably not so liable to winter-kill or to be drowned out by wet weather. This is a most excellent honey plant, and should be sown by apiarists. It forms fine pasture and makes good hay for cattle and sheep. It is best for provender when mowed at the full maturity of the blossoms. The aftermath is both dense and heavy, and endures until late in the autumn.

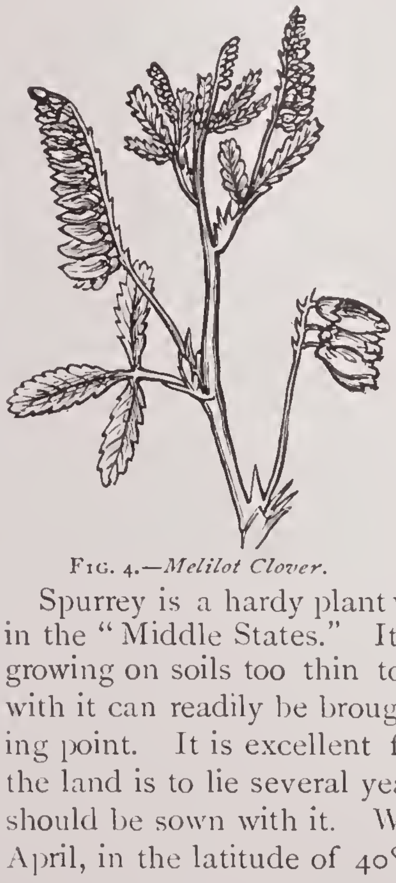


Fig. 4.—*Melilot Clover.*

Melilot or sweet clover, Fig. 4, both white and yellow, blooms from the middle of June till the first of October. It is a most excellent bee plant. Its perfume scents the air for a long distance. These clovers are biennial, not blooming the first season, and dying after they bloom the second season. They have no value except for honey, and are said to become pernicious weeds if allowed to spread.

Spurrey is a hardy plant which grows spontaneously in the "Middle States." Its chief merit consists in its growing on soils too thin to bear clover. Poor soils with it can readily be brought up to the clover-bearing point. It is excellent for cows giving milk. If the land is to lie several years in pasture, white clover should be sown with it. When sown in the middle of April, in the latitude of 40° or 41°, it is ripe for pasture by the end of May. When eaten off in June, the land is turned flat and another crop is sown, which affords fine pasture in August and September. This operation is equivalent to a dressing of ten loads of manure per acre.

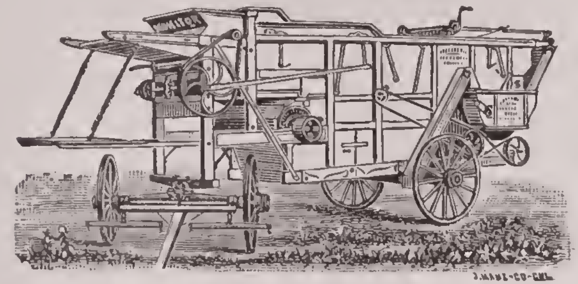


FIG. 4.—*Birdsell's Clover Separator.*

Three crops can be grown upon land in one season, which, if turned in or fed on the ground can be made a means of rapid improvement. See Alfalfa or Lucern.

Cloves, a valuable aromatic. The oil of cloves applied with raw cotton, is said to be very effectual in relieving toothache.

Clyster, an injection of water or medicated fluid into the bowels by means of a syringe; an enema. We give the following forms of clyster used for cattle and horses:

Laxative Clysters, useful in obstinate constipation, "stoppage," or whenever the excrement is hard and dark colored:

3 or 4 Quarts warm water,
8 Ounces linseed oil,
1 Tablespoonful common salt (fine).

Another:

4 Quarts warm water,
1 Gill soft soap,
½ Tablespoonful fine salt.

Emollient Clyster, to be used in all cases of irritation and inflammation of the intestines and bladder:

2 Ounces slippery elm bark,
2 Quarts boiling water.

Simmer over the fire a few minutes, strain through a fine sieve, and inject, when nearly cool. The following articles may be substituted for elm: flaxseed, lily roots, gum Arabic, poplar bark, Iceland moss.

Stimulating Clyster, to be used in all cases when the rectum and small intestines are inactive and loaded with excrement, or gas:

3 Quarts of thin mucilage of slippery elm or linseed tea,
1 Teaspoonful African cayenne, pure.

Another:

½ Tablespoonful powdered ginger,
3 Quarts boiling water.

When cool, inject.

Anodyne Clyster, used to relieve pain and relax spasms:

1 Ounce lady's slipper (Cypripedium),
1 Ounce camomile flowers,
3 Quarts boiling water.

Let the mixture stand a short time, then strain through a fine sieve, when it will be fit for use.

Diuretic Clyster: This form of clyster may be used with decided advantage in all acute diseases of the urinary organs. This injection is useful in cases of red water, both in cattle and sheep; and when the malady is supposed to result from general or local debility, the addition of tonics (golden seal or gentian) will be indicated. Their active properties may be extracted by infusion.

3 Quarts linseed tea,
1 Tablespoonful oil of juniper

Or, substitute for the latter, cream of tartar, half an ounce.

Astringent Clyster: Take an infusion of hardhack, strain, and add a tablespoonful of finely-pulverized charcoal to every three quarts of fluid.

Another is an infusion of witch hazel.

Another:

1 Tablespoonful powdered bayberry bark,
3 Quarts boiling water.

When cool, it is fit for use.

Astringent injections are used in all cases where it is desired to contract the living fiber, as in scouring, dysentery, scouring rot, diarrhœa, bloody flux, falling of the womb, fundament, etc.

Nourishing Clysters: These are composed of thin gruel made from flour, etc.

Injection for Worms: Make an infusion of pomegranate (rind of the fruit), and inject every night for a few days. This will rid the animal of worms that infest the rectum; but if the animal is infested with the long, round worm (teres), then half a pint of the above infusion must be given for a few mornings, before feeding.

Another for worms:

1 Ounce powdered lobelia,
1 Handful wood ashes,
3 Quarts boiling water.

When cool, it is fit for use.

Coach, a large, close, four-wheeled carriage, having at least two seats within and capable of holding four persons. See Carriage, page 161.

Coagulation, to gather into masses, as butter in churning, or curd; to thicken, as loppered milk.

Coal. Stone coal is the hardened remains of vegetable matter, being chemically a condensation of gases, which with a common fire are easily decomposed. Anthracite is the hardest species, having but little or no sulphur, is nearly pure carbon, is difficult of combustion and burns with but little flame. This kind of coal is most abundant in Pennsylvania and Wales. Bituminous coal, such as that of Virginia, Ohio and the Western States, is softer, more sulphurous and combustible, and produces considerable flame. Wood coal resembles charred wood, and in burning gives considerable light. Cannel coal is similar, but is very homogeneous in its texture, being easily carved into statuesque forms. It gives a steady flame when burned. Hard coal (anthracite) is the best for heating sitting-rooms, if burned in a "base burner;" but in the distant West is too expensive.

The breathing of the gases from burning coal is disagreeable and unhealthful, and smoky stoves and fire-places are to be dreaded. Many persons imagine that what they take into their lungs from burning coal cannot be very unhealthful, as it does not signally and immediately bring upon them serious sickness; but the foundations of future incurable diseases should be avoided, at almost any expense. As the country becomes more wealthy, the citizens manage to obtain more efficient heaters, furnaces, etc., and learn to avoid the effluvia of burning coal. In throwing "fine" or pulverized coal upon a fire (unless to keep it over night or for several hours without burning), but little should be thrown on at a time, to prevent puffs of smoke into the room. Throwing water upon coal is no advantage in small fires, such as we have in common stoves.

Coal Tar, a tarry fluid of a complicated nature, produced during the distillation of bituminous coal for gas. It is a cheap and excellent paint for ironware, railings, rough wood-work in some situations, and is much used for saturating ropes, and such coarse paper as is employed in rendering buildings warm and comfortable.

Coal tar in almost any form in which it can be used is a powerful disinfectant. When it is distilled, it furnishes, first, a light oil which is a naphtha; and next a heavy oil. This last is, in great part, composed of creasote, and contains also an acid known as carbolic acid, both of which are among the most powerful of all known antiseptics, disinfectants and deodorizers. Meat steeped for about 24 hours in a solution of 1 part of creosote to 100 of water, is rendered incapable of putrefaction, and acquires a delicate flavor of smoke. It is the presence of this principle in wood smoke that gives it its characteristic smell and its power of curing meats.

Cobbler, in cookery, is a name sometimes given to a kind of large fruit pie or dumpling. The fruit is prepared as for pie, enveloped in a sheet of dough or paste like a dumpling, and steamed or baked. It is a fine and economical dish.

Cochineal (coch'i-neal), a dye-stuff consisting of the dried bodies of a Mexican insect (the female only), flourishing upon cactus. This material yields several shades of red, and is used as a dye for coloring tinctures and other medicines for the purpose of deception. Druggists color water with it, for filling their show bottles usually found in their store windows.

Cochin, a breed of fowls, of which there are several varieties. See Fowls, Domestic.

Cockerel, a young cock or rooster.

Cocklebur, a foul weed, bearing elliptical, thorny burs: has been called "smaller burdock." It is a great pest in some fields.

Cockroach. Borax is one of the best of roach exterminators. There is something peculiar, either in the smell or touch of borax, which is certain death to them. They will flee in terror from it, and never appear again where it has once been placed. It has also the great advantage of being perfectly harmless to human beings; hence there is no danger from poisoning. The borax should be pulverized and sprinkled around the infested places. Another infallible means of destroying black beetles and cockroaches is to strew the roots of black hellebore on the floor at night. Next morning the whole family of these insects will be found either dead or dying, for such is their avidity for the poisonous plant that they never fail to eat it when they can get it. Black hellebore grows in marshy grounds and may be had at all herb shops. Cockroaches and water-bugs may also be destroyed by placing vessels containing molasses where they abound. A small stick should be laid from the edge of the vessel to the floor. They will not return upon it. A decoction of poke-root, spread on plates with molasses, oil of cedar, pulverized pepper and insect powder are also highly recommended.

Cocoa, a preparation of the ground bean of the chocolate tree, to be used in making a beverage. To prepare the latter, boil two large spoonfuls of ground cocoa in a quart of water half an hour; skim off the oil, pour in three gills of milk, and boil it up again. It is the best way to make it the day before it is used, as the oily substance can be more perfectly removed when the cocoa is cold.

Cocoanut, the fruit of the cocoanut palm, well known throughout the world. The nut ground and dried, known as "desiccated cocoanut," can be obtained at the groceries, and is used in various culinary preparations. See also Cake and Pie.

Cocoon, the envelope of silk or other substance growing around a caterpillar or other larva when it is undergoing its transformation to the winged or perfect state. The insect and its envelope are together called a "chrysalis," or "pupa."

C. O. D. Collect On Delivery: a term used in connection with goods sent by express, when the express company is authorized to collect for the value of the goods as named by the consignor. In this way, goods may be ordered from the city and paid for on receipt. Sometimes the privilege to examine the goods before receiving is granted by the party sending, but generally payment is required before examination. In sending a package C. O. D., make out a receipt bill for the amount you desire the express company to collect, and deliver to the company. The company is then responsible for the return of the money or the goods. It is a very safe and satisfactory way of sending goods to strangers, although the additional expense of returning the money is incurred by the party receiving them.

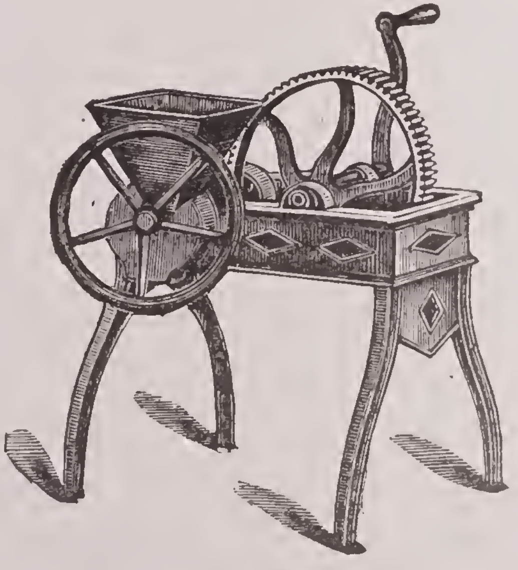
Cod-Liver Oil. This is extracted from the fresh liver of the cod by a heat not exceeding 180°. There are three varieties in market—the white, or pale yellow, the brownish yellow and the dark brown, but they are of equal value. The odor is similar to that of shoe leather, and the taste disagreeable. In all animals, cod-liver oil increases fat and flesh. It is now considered a very valuable remedy. There has been so great a demand for it that the oil of every fish caught has been sold for it. It is employed where an exalted temperature is maintained at the expense of the tissues. In such cases it saves the tissues, and the burning of flesh-forming food. The principal diseases for which this is prescribed and taken are consumption and scrofula. In cases of emaciation it is used with good results. In children, evidently, where the mesentery glands are diseased or defective, cod-liver oil has been found one of the most beneficial remedies. The dose for infants and small children is from ½ to one teaspoonful three or four times a day, in a little breast or other milk; for youths and adults a tablespoonful three or four times a day. The taste of cod-liver oil is completely disguised by masticating a morsel of dried orange peel before and after swallowing the dose, or by the use of a lump of brown sugar.

In diseases affecting digestion and assimilation cod-liver oil can be of no use. It materially relieves broken wind, or heaves in horses. For hastening or forcing animals intended for shows, cod-liver oil is just what is wanted, as it not only hastens the fattening process, but increases the quality and appearance of the meat.

Coffee. There will be coffee-drinkers as long as the "world stands." While parched grains, roots, etc., satisfy some people as a basis of a mild beverage, most people in this country will have genuine coffee. This grain should never be purchased from the store already ground, as such is generally adulterated with chiccory, liver of animals, burnt sugar, Venetian red, okra, potato, etc. As long ago as 1850, a patent was taken out for a process for molding chiccory paste into the form of coffee grains. But even pure coffee, if ground, gradually loses its aroma. In browning coffee, it should not be burned, or even scorched, but parched to a light brown.

To roast coffee, dry it in the oven an hour or two before roasting, then put it on the stove in a round-bottomed kettle, and stir constantly until it becomes brown. Two pounds of coffee roasted at one time is sufficient for a small family. Add a piece of butter the size of a walnut just before taking up. Put it while steaming hot into a box with a close cover. It should be ground as it is wanted.

For grinding coffee, L. J. Miller of Cincinnati, Ohio, furnishes a hand and power mill, which is not only good for this purpose, but also for grinding grain for mushes and bread. (See also Grist-mill.)



Coffee Mill.

To Make Coffee. Put a coffee-cupful into a pot that will hold three pints or two quarts; break an egg into it, or some egg-shells, or a bit of fish-skin an inch square; pour on a quart of boiling water. Boil it ten minutes, take it off, turn a cupful out at the spout and back again into the pot; pour in half a cupful of cold water, and let it stand ten minutes to settle. Turn it off into another pot to send to table. Boiling cream or milk should always be served with coffee.

To make coffee in a biggin put the ground coffee into a filter, wet it with cold water, and let it stand five minutes to swell. Put the filter into the pot where it belongs; fill it up with boiling water, and set where it will keep hot and not boil. When this has run through, add water until you have made a quart of coffee. It does not require more than ten minutes to make good coffee. The best kinds of coffee are the Mocha and the Java, and it is considered an improvement to mix the two. West India coffee, though of a different flavor, is often very good.

Never let coffee, once made, stand in tin.

Effects of Coffee on the Constitution. Coffee exerts a very powerful influence on the sympathetic nerves and brain; and for this reason, after taking it, all feelings of drowsiness are dispelled while the system continues under its influence. Coffee possesses this property, chiefly owing to the empyreumatic oil it contains. It is for this reason that the beverage should always be prepared from the freshly-roasted berry, ground immediately before use. Coffee contains a considerable quantity of nitrogen, which tends to render it more nutritious. Coffee as a beverage is most suitable for elderly or thin individuals. It is not so well adapted for persons of an excitable temperment, or for plethoric individuals. It is liable to produce, if taken to excess, hæmorrhages from the bowels, and congestion of the liver. It is thought that coffee promotes digestion when taken after a meal, and that it also removes the symptoms caused by too great an indulgence in wine; but as a matter of fact, if taken immediately after a meal, it impairs the action of the stomach and injures the digestion. These affections are, however, thought to disappear more readily on persons leaving off its use, than those complaints which are produced by the excessive use of strong tea.

Coffee Milk. Put a dessert spoonful of ground coffee into a pint of milk; boil it a quarter of an hour with a shaving or two of isinglass; then let it stand ten minutes, and pour it off.

Coffin, in farriery, is the hollow part of a horse's hoof, or the whole hoof below the coronet, including the "coffin" bone, which is a small, spongy bone in the midst of the hoof.

Coins, Old, To Clean: Rub them with a nail brush dipped in strong lye made of wood ashes.

Coke, the cinder of mineral coal after being heated for gas. It is light and inflammable, but lacks strength as compared with its former condition. There is a heavy coke, however, made for manufacturing purposes. Only the sulphur and other injurious elements are driven out. Coke, in combustion, gives an intense heat, without smoke, but leaves a great deal of ashes. In using it for an open fire it should be broken into lumps about the size of a goose-egg, and laid on top of the fire, but not in front.

Colander (cul'en-der), a perforated vessel for straining liquors, or separating the finer elements of a mixture from the coarser. A slight hygienic objection to the use of tin colanders consists in the fact that it is difficult to keep the perforations perfectly dry and clean, and the rust and filth that accumulates in them are unfit to go into our food.

Colchicum, meadow saffron. This is not the common yellow or garden saffron, but a native of Europe, which in September bears two to six lilac or pale purple flowers. Not raised in this country. The seeds and root are the parts usually employed in medicine, sometimes in powder; but the best is in the form of a tincture. In veterinary practice it is given in all rheumatic affections of the joints, and in lumbago, and also in diseases of the eye of the horse, depending on rheumatism of that organ.

Dose. Of the corm or seeds in powder for horses and cattle, the dose is from one to two drachms, given in the animal's feed twice in the day, for a week or two. The wine of colchicum will answer for the dog, in from 5 to 15 drop doses, twice a day in a little water.

Cold, a fever caused by a stoppage of the pores of the skin. The cause and symptoms of this disease are so well understood that little need be said in regard to these. Oppression of the breast, stoppage of the nose, sneezing, weariness, chills, pain in the head, and cough are the usual attendants. But few diseases require more attention than this, and but few are more neglected. Remember that neglected colds are frequently dangerous, and often result in incurable diseases. A cold produces cough, then certain pains in the side, fever, difficulty in breathing, and finally ends in consumption.

The thing to do, of course, is to open the pores of the skin, and this is generally accomplished, or attempted to be accomplished, by a course of sweating. If fasting and hand-rubbing of the skin are also persisted in for a day or so, the cure will generally be successful. Sweating indeed opens the pores of the skin, but the patient generally comes out of the process in such a way as to reproduce the disease. On coming out, vigorous hand-rubbing should be given until the skin is perfectly dry and somewhat pinkish, and then the patient should immediately cover up warm in bed again, and remain there until he feels like arising and taking exercise. For persons not subject to any lung or heart disease, the Turkish bath (see Hygiene) is recommended, as one such bath, if properly terminated, is sufficient to cure almost any cold instantaneously. In taking a sweat by a pack, voluntary breathing greatly aids the process. In fact, heavy, voluntary breathing in a dry pack, in a room well ventilated, is often the best method of curing a cold. Drinking herb teas, especially those made hot by pepper and other spices, is preferred by many, but effects no better cure than so much hot water. They are all merely different methods of making hot water palatable, so as to prevent nausea. One day's treatment, properly administered, is sufficient to cure almost any cold; sometimes the process should be repeated the next day, in which case the patient should eat but little, and the treatment given as far from the meals as possible, as there should be no food in the stomach at the time.

Cold Chisel, a chisel of peculiar strength and hardness, for cutting cold metal.

Cold Frame, a framed bed, of the nature of a hotbed, for the early propagation of plants. The cover is removed during the day, unless the weather is too cold, that the plants may not become too tender.

Cold frames are extensively used by market gardeners to carry lettuce and cabbage plants through the winter. Select the locality in the fall, choosing a warm location on a southern slope, protected by a fence or building on the north and northwest. Set posts in the ground, nail two boards to these parallel to each other, one about a foot in height and the other toward the south about four inches narrower; this will give the sashes resting on them the right slope to shed the rain and receive as much heat as possible from the sun. Have these boards at a distance apart equal to the length of the sash, which may be any common window-sash for a small bed, or the length of a usual gardener's sash. If common window-sash is used, cut channels in the cross-bars to let the water run off. Dig the ground thoroughly (it is best to cover it in the fall with litter to keep the frost out), and rake out all stones or clods; then slide in the sash and let it remain closed three or four days that the soil may be warmed by the sun's rays. The two end boards should rise as high as the sash to prevent the heat escaping, and the bottom board of a small frame should have a strip nailed inside to rest the sash on. Next rake thoroughly in guano or phosphate or finely-pulverized hen manure, and plant in rows three to six inches apart, depending on whether the plants are to be allowed to remain or are to be transplanted; if the latter, then three inches will be sufficient distance. Thin out the tomato plants when quite small, but allow peppers to remain rather thick at first by reason of danger from depredations of the cut-worm. As the season advances, raise the sashes an inch or two in the middle of the day, and water freely at evening with water that is nearly of the temperature of the earth in the frame. As the heat of the season increases whitewash the glass, and keep them more and more open until about the close of May, just before the more tender varieties are set in open ground, you allow the glass to remain entirely off both day and night, unless there should be a cold rain. This will harden them so that they will not be apt to be injured by the cabbage beetle, as well as chilled and put back by the change. If the tomato plants have been well hardened, the stalks will be of a red color. Should the plants be getting too large before the season for transplanting, they should be checked by drawing a sharp knife within a couple of inches of the stalk. If it is desirable to dwarf the tomatoes and thus force them into a compact growth, transplant into another cold frame, allowing each plant double the distance it before occupied. Early tomato plants in a small way may be raised in flower pots or boxes in a warm kitchen window; so also may egg plants and peppers. When raising them in the house, the pot or box containing the seed should be placed quite near the stove for a few days, and the soil be kept well moistened until the plants begin to break ground, when they may be removed to a warm window. It is best, if practicable, to have but one plant in each pot, that they may grow short and stocky. If the seed are not planted earlier than the first of April for out-of-door cultivation, a cold frame will answer.

Colewort: see Rape; also a name given to non-heading early cabbages, and is corrupted to "collards."

Colic, a spasmodic pain in the stomach or bowels, which is relieved by pressure upon the abdomen as the patient is inclined forward, or lies face downward with the abdomen upon a support. It prevails mostly among infants, and is temporary, but severe. In children it is generally produced by too much food, or some improper diet of the mother, and sometimes from exposure to cold or change of clothing, and often from bad quality of the milk. It makes its attacks suddenly, by violent screaming, kicking, drawing up of the legs, and frequently a stoppage of the urine or water. This complaint attacks those children who are subject to it, so suddenly, and often with such violence, that we should always be careful to attend to it at once, or it may produce convulsions. Nursing children are very subject to the colic, which is often so severe as to produce a cold sweat.

Treatment. Paregoric seldom fails to procure relief. Children can take from ten drops to a teaspoonful. Half a teaspoonful is a medium dose for a child a year old. In children, where the distress is great, an injection, made of a small quantity of common salt dissolved in warm water, will often procure the most instant relief. Half a teaspoonful of castor oil and half a teaspoonful of paregoric, mixed, will effect a cure. In some cases, a little peppermint, or pennyroyal, or ginger tea, given warm, will remove the colic. Dry, hot flannel cloths should be put to the stomach, and a bottle of hot water or a hot brick to the feet, or warm bathing and rubbing, or friction, over the stomach and belly, with some liniment, will give great relief. When the child is costive, or bound in its bowels, a gentle purgative of manna or castor oil will be required to relieve the flatulence and constipation, or costiveness.

Colic, Bilious and **Cramp,** is characterized by excruciating pain in the region of the navel, thirst, feverish symptoms, vomiting of bilious matter, and costiveness. The attack generally commences with a bitter taste in the mouth, followed by vomiting of a yellow-greenish matter. The bowels are constipated; little or no discharge of urine; the pain about the navel will sometimes shift from place to place; a sort of hoarseness usually attends the patient throughout the disease, and more or less fever. Sometimes there are cramps in the stomach and limbs.

Treatment: First evacuate the stomach by an emetic of warm water and salt; drink copiously. Move the bowels with a mild cathartic. Apply a large mustard plaster wet with vinegar over the stomach and bowels. After the mustard has been borne as long as it can be, remove it and apply constantly to the abdomen flannel or other cloths dipped in hot water. This will have a soothing and relaxing effect.

Collar, in mechanics, a metal ring around the end of a cylinder of wood to prevent splitting, or a ring around a piston or a journal, for securing tightness or steadiness. In botany, the "collar" of a plant is the junction of the roots with the stem or trunk of the plant, at the ground. For horse-collar, see Harness.

Collateral, stock, bond, mortgage, or other commercial "paper" used as security for a loan.

Colley, the Scotch shepherd dog: see Dog.

Collodion, a solution of gun-cotton in ether. Gun-cotton is a highly explosive substance obtained by soaking common cotton, or indeed any other vegetable fiber, in nitric and sulphuric acid, and then leaving it to dry. It is occasionally used as a substitute for gunpowder. Collodion is used for dressing wounds and cuts, instead of sticking-plaster. In veterinary surgery it is applied in the following manner: clip the hair from the edges of the wound, take a camel's-hair pencil, or a soft brush, and paint the surface and edges of the wound well, and in a few minutes the ether, which holds the gun-cotton in solution, evaporates, leaving over the sore a complete covering, resembling the gold-beater's skin, thus completely shielding the sore from the action of the air; hence its value.

Cologne Water. Mix alcohol, 1 gallon; oil of lavender, 12 drachms; oil of rosemary, 4 drachms; essence of lemon, 12 drachms; oil of bergamot, 12 drachms; oil of cinnamon, 12 drops.

Colter, Coulter or **Cutter,** the cutting iron (or steel blade) of a plow; either "upright" or "rolling."

Coloring: see Dyeing, Painting and Staining.

Commode (com-mode′), a chest of drawers, often with shelves added; also, a dry-earth closet; see Privy.

Common Carrier, a party who makes periodical trips for the purpose of carrying goods or letters, as the express companies, postal agents, etc.

Communism (com′-u-nizm), "having all things common;" that is, having all property in the hands of the community at large, and none of it in the possession of any individual.

Complexion: see Face.

Compost, a rotted mass of mixed manures. It is called Ash, Guano, Lime, etc., according to the prevailing fertilizer or other ingredient employed. Ordinary compost for garden use may be made by mixing the manure of spent hot-beds with equal quantities of fresh barn-yard manure and swamp-muck, or sods pared from alongside fences, or from any spot where water often settles. To these add air-slacked lime equal to one-twentieth of the whole bulk, and an equal quantity of unleached ashes, or double this quantity of leached, and throw in and cover any decaying animal matter, or drainage from the slaughter-house. Watch the heap, keeping a stick thrust into its center, to serve as a thermometer. Whenever, on withdrawing the stick, you find it getting hot, turn the heap over and inside out; re-insert the stick, watch it and repeat the operation several times until it is made quite homogeneous, say several weeks. In turning over the mass it is well to sow in a little plaster (gypsum). The lime should be mixed with stable manure when it is cool, else it will drive off the ammonia instead of retaining it. Ash compost is composed of equal quantities of ashes and gypsum, carefully mixed or sifted together. Keep it dry and apply it to the ground by sowing just before a rain. Guano compost may be made of guano, or hen manure, mixed with one-half the bulk of ground gypsum, and four or five times the bulk of rich loam, and allowing the mass to remain in a dry place for several weeks and turning it once or twice during the time. In applying this compost to planted ground, it should be covered with soil, that there be no loss of ammonia, etc.

For flowers, the best compost is made of good loam, leaf-mold, peat, road-wash, sand and rotted manures. Good loam is rather dull yellow, not reddish, and when moderately dry it has a kind of cheesy softness on cutting, is friable when thrown up with a spade, break-into rather coarse granules, a lump when broken showing the same structure; yet it is not clayey or liable to break hard after a rain. All manures should be one or two years old and thoroughly reduced by turning, chopping and mixing. The manure of spent hot-beds is generally used for flower composts, but for certain kinds of flowers sheep manure and blood, or other animal matter, are said to be most valuable.

Compounding or **Composition,** in commerce, an agreement between a debtor and his creditors whereby they accept only a portion of their claims in final settlement. To "compound a felony" is to accept of a consideration for forebearing to prosecute.

Compromise (com'pro-mize), in business or legal transactions, a settlement made by mutual concession.

Concrete, a mixture of lime, sand and gravel, used as a substitute for stone in building. The proportions are: 60 parts of coarse pebbles, 25 of rough sand, and 15 of lime. Sometimes other proportions are used. A well-built concrete wall is unaffected by frost. Sand, gravel and asphaltum, or coal-tar, mixed together, is also called "concrete," and are used in laying walks. The essential quality of concrete seems to be that the materials used should be of small dimensions, so that the cementing medium may act in every direction around them, and that the latter on no account be more in quantity than is necessary for that purpose.

Concussion, striking against, as one body against another. Sometimes, by a fall, a person has his "breath knocked out of him," and in such a case he should be kept quiet and warm, in a room of fresh air, until he revives. Do not raise the head too high, or keep him on his back. An old custom is to give the patient a little water and brandy, but the majority of physicians at the present day do not recommend it.

Condiments, substances used to season food. The following is an alphabetical list of the more common ones, most of which are treated in their respective places in this volume: Bay Leaves, Butter, Cheese, Cinnamon, Cives, Cloves, the Essences and Extracts, Cream, Garlic, Ginger, the Liquors, Mace, the Mints, Mustard, Nutmeg, Onion, Parsley, Pepper, Pepper-grass, Salt, Summer Savory, Sugar, Thyme, Vanilla and Vinegar. The flavor from scorching a part of the food, as of corn bread and parsnips, is really of the nature of a condiment.

Condition Powders. For a horse suspected of indigestion, the following will be useful: One ounce powdered assafœtida, 2 ounces powdered ginger, 5 drachms powdered sulphate of iron, 1 ounce powdered golden seal, 2 ounces powdered poplar bark, 1 drachm powdered capsicum, 1 pound oat meal. Divide the mass into 16 doses, one to be given in the food every night. For hidebound, when there seems to be no particular disease, give nutritious food, and the following: 3 ounces each of powdered sassafras bark, of powdered sulphur, and salt; 2 ounces each of powdered bloodroot and balmony, and 1 pound of oat meal. Mix and divide into 12 parts, and give one daily in the morning feed. Unless there is a plethoric habit (too much blood) from standing still and want of exercise, reduce the food, give proper exercise, and, if the dung be hard, give 2 to 4 ounces of aloes twice a week, and also an ounce of saltpeter in the water as often. If this does not bring the animal around, give twice a week of the following: ½ ounce each of Fowler's solution of arsenic and iodide of potash, mixed in a pint of water, and give with water or gruel. Avoid arsenic, however, on general principles, to get up a sleek coat. It is valuable when properly used, but you must know what you are using it for.

Confectionery, Confections, candies and sweetmeats: see Candy.

Congestion, a determination of the blood to any part, as the lungs, liver, brain, bowels, etc. Generally relieved or cured by producing an excitement in some other part of the system, what particular part being indicated by the nature of each case. A physician should be called, but fomentation near the parts is safe and efficient.

Conservatory, a building with a glazed roof, in which plants are grown in a bed or border of soil precisely as in open air; also an out-house, built upon the ice-house plan, for the preservation of fruits and vegetables for table use. See Ice-House.

Consignment, the merchandise shipped to a consignee.

Consignor, the sender of goods, by a public conveyance; "consignee," the party to whom such goods are sent.

Constipation or **Costiveness,** a hardening of the contents of the bowels. Sometimes even a sort of diarrhœa may attend this condition, that is, fluid and strained discharges may take place while the hardened fæces are still retained in the intestines. Nearly all constipation is caused by eating too much concentrated food, or white bread and butter, sugar, starch and the like, sometimes by the eating of raspberries, blackberries and other astringent fruits, and very often by the use of astringent medicines. Coffee and tea produce some of its worst forms. The cure, therefore, consists in removing the cause, that is, by abstinence from the use of the foregoing substances, and the substitution of graham and corn bread—indeed, any of the numerous preparations from the grains instead of the common white flour. Juicy fruits which are not astringent, and "vegetables" should also be eaten.

Where there is defective secretion from the bowels, it is usual to resort to that class of remedies called cathartics, and with many the more active remedies are employed. It has been noticed by almost every one that an inaction always follows, and is usually in proportion to the increased activity produced by the cathartic; so that it is said by some that the most pressing want in therapeutics is a remedy which will act thoroughly on the bowels, and yet leave them in a soluble (active) condition. To overcome habitual constipation there are no remedies of this class that can be employed with any certainty, and one should depend principally upon hygienic measures, which are really the most natural as well as the best. Such a person should drink a tumbler of water on rising in the morning, rub the bowels thoroughly with the hand, and after breakfast solicit a stool. If this is persevered in, a habit will be established which will give a healthy activity of this function, and remove all the derangements that have been produced by the constipation.

Consumption, Pulmonary. This disease, which is very prevalent in this country, has its seat in the lungs. The structure of the lungs consisting of what we may term an interwoven mass of extremely delicate and fragile vessels, its tender membranes are consequently very susceptible to injury. Tuberculous consumption is a disease which for insidiousness and fatality has no prototype. It is due to the formation of tubercles, resembling small boils, in the lungs, which make their first appearance in a grey, semi-transparent, granular form, gradually enlarging and ulcerating until they finally destroy the lung. The first stage of this disease frequently commences with drowsiness and a headache. These are followed by a cough, which is very slight at first, and only heard in the morning. It next occurs during the day, and is accompanied by the expectoration of a transparent fluid resembling saliva. When taking exercise or ascending stairs the breathing becomes oppressive, and occasional darting pains are felt in the chest. The pulse soon begins to beat more rapidly, the body becomes heated and chilled at short intervals, a burning sensation is experienced in the soles of the feet and palms of the hands. At night the victim is slightly feverish, and in the morning perspires slightly. The countenance assumes an expression of languor, and grows pale. The flesh wastes away, and strength decays. At this stage of the disease a change of weather or removal to a warmer or less fickle climate will for a time at least dissipate such symptoms; and now, if ever, the progress of the disease must be earnestly and carefully striven against. In the next stage of this disease the fluid expectorated undergoes a striking change, specks of opaque matter of a yellowish color, due to the rupture of an abscess, with sometimes streaks of blood, appear in it, and at the same time the other symptoms above mentioned become aggravated. The cough, the alternate heats and chills, and the morning perspirations, increase in severity and in frequency. Hectic fever is established, the pulse and breathing become more hurried, the flesh grows flabby, and the body becomes more wasted. The delicate flush, which is so well known as the most fatal symptom of this disease, appears in the cheeks, and blood appears with greater frequency in the expectorations. The third and final stage of this disease follows closely upon the second. Diarrhœa comes on, the perspirations and expectorations become more copious, and the coughing incessant. The feet and ankles swell, the breathing is oppressive, the chest sinks in, and a gurgling sound marks every expiration of the breath. The patient grows rapidly weaker, and soon after dies. Consumption varies in its nature to some extent in different cases, but the above are the ordinary symptoms. Amongst other symptoms more or less common is a certain form of indigestion known as "strumous dyspepsia," which creates a strong distaste of all food of a fatty nature by heartburn and acidity of the stomach. The appetite usually remains unimpaired.

ACUTE CONSUMPTION is so called from the rapidity with which it runs its course.

LATENT CONSUMPTION is so gradual in its progress, that up to the period of dying scarcely any of the usual symptoms are discoverable, and very often only dissection makes the cause of death quite clear.

FEBRILE CONSUMPTION is that which is brought on by a cold.

CHRONIC CONSUMPTION is the most common form of this disease, and the least understood. Patients suffering from it often linger on from year to year, and enjoy at intervals more or less long, all the characteristics of perfect health. It is, however, nearly always fatal.

CAUSES OF CONSUMPTION. These are classified as exciting and remote. Under the last of these heads is included hereditary predisposition. Whatever occasions a determination of blood to the lungs, or irritates them, will in case of scrofulous individuals produce partial effusions of scrofulous lymph in the cellular substance of the lungs—in a word, tubercles. These prevent the due expansion of the lungs, and, of course, that free circulation of the blood through the pulmonary organs which is of vital importance. It was formerly held that the tubercles had their origin in inflammation of the lungs, but this idea has, we believe, been entirely abandoned by all our best authorities. Improper diet, impure air, deficient exercise, injudicious clothing, a want of cleanliness, drunkenness, or anything which tends to deprive the body of its due nutrition, is an active agent in producing scrofula or king's evil, which is now identified with consumption. Amongst other causes are mental anxiety, exposure to cold and wet, over-exciting aliment which gives the digestive organs an undue proportion of work, excessive sedentary labor, tight lacing, breathing an atmosphere impregnated with dust, etc.

TREATMENT OF CONSUMPTION. Consumption is so insidious in its first approaches, and so rapid and strong in its after progress, that too much care cannot be exercised in watching for premonitory symptoms in those who are predisposed for its reception. At first the disease produces so little inconvenience to the patient that he is not alive to the importance of at once checking it, and instead of having immediate recourse to medical advice, he pooh-poohs the words of those who bid him do so, and foolishly allows the disease to work its fatal way in secret, undisturbed. The treatment usually adopted is that which strengthens the system to resist its approach, and acts upon the seat of its development. In the first case, nutritious diet of a wholesome, non-stimulant kind, and frequent gentle exercise in fresh, mild, pure air, generally that of the sea-side, are recommended, with regular and particularly cleanly habits. Cod-liver oil is a very valuable remedy, which has been adopted with the most beneficial results in numerous cases. Tonic medicines, such as bark, sarsaparilla, iron, and iodine, are also very beneficial where the symptoms of febrile conditions do not exist. Counter-irritants applied to the upper parts of the chest are used where inflammation is apparent, and in some cases warm baths are found to do good service by promoting more vigorous circulation in the extremities and in the surface of the body generally. Care must be taken not to check the perspirations, either by diminishing the quantity of bedclothes at night or by throwing them off in the morning. When the purging occurs care must be exercised in not checking it too suddenly. Carefully selected diet will serve best to moderate it. From the foregoing directions it must appear evident that a low diet should be adopted, and everything avoided that has a tendency to inflame the constitution. The jellies of arrow-root, sago, tapioca, oat meal, and light bread pudding may be occasionally varied, as agreeable to the inclination of the patient. The animal jellies of calves' feet, hartshorn shavings, and isinglass; a little boiled fowl, shell-fish, flounders, and soles (without sauce) may be allowed when febrile symptoms are not high, or when the system is not irritable; but animal food in substance, as beef, mutton, lamb, and pork, and wine and spirits of all sorts, must be scrupulously avoided. The beverage should be very simple, such as the almond emulsion, whey, distilled water, linseed-tea, weak lemonade, buttermilk, and barley-water. Flannel should be worn next the skin; and any sudden transitions from heat to cold, and vice versa, must be carefully guarded against; and as a light atmosphere is more easy of respiration than a heavy one, the patient should sleep and live as much as possible in the uppermost room of the house. By a strict observance of these instructions the progress of the disease may be speedily and effectually suspended, the effect of the diseased action removed, the lungs rendered adequate to their important functions, and the patient, of course, gradually restored to his usual strength and health. Some writers disapprove of a milk diet in this disease. The experience of many ages and the arguments which may be adduced from analogy have, however, proved, to the conviction of every candid inquirer, that it affords a nutriment admirably adapted to support the debilitated frame of a consumptive patient. When it is found to be too heavy for the stomach it may be diluted with barley-water or distilled water, which will often reconcile it to the stomach. Ass's milk, being thinner than that of the cow, often agrees better with the patient. Some, however, have so great an aversion to the milk of this animal that they cannot be prevailed on to take it. In such case some substitute of a kindred nature should be adopted.

It is generally agreed that there is no cure for genuine consumption after it is well established, but that the ordinary laws of health constitute the only hope of the patient for a mitigation of his sufferings. Sometimes a faithful observance of these laws, especially those relating to the use of pure air, have arrested the progress of consumption. An out-door life is the most important thing, especially in a climate where the air is pure and bracing. A predisposition to this dreaded malady may be prevented from developing into the real pulmonary phthisis, by special exercise of the lungs in pure air from infancy up, conjoined with a general observance of the laws of health. See Hygiene. Above all do not dose yourself with any of the numerous advertised "sure cures for consumption."

Contagion. This term is applied to something (as the virus of glanders) coming in contact with the body of an animal in health, producing a similar disease to that existing in the animal from which it came. In a word, it is a specific poison, like that of small-pox, syphilis, scarlet fever, measles, etc. Diseases may be epidemic and not strictly contagious. (See Epidemic). Few diseases of animals are considered contagious. The following diseases, however, are considered of that character: Aphthous fever, malignant anthrax, canine madness, contagious pleuro-pneumonia, cow-pox, distemper or strangles, cholera (hog and Asiatic), glanders, rinderpest, typhoid and bilious fever, scab, itch, etc. In malignant anthrax, malignant hog cholera (intestinal fever), glanders, canine madness and contagious pleuro-pneumonia, the disease being well defined, it is cheaper to kill and bury deeply than to attempt a cure. Rinderpest we have never had on this continent. Contagious diseases incident to this country will be treated under their appropriate names.

Although many animals may be taken sick one after another, this is no proof that the disease is contagious; for it must be remembered that a number of animals, all situated and cared for in the same way, are certainly subjected to the same exciting causes that produced the disease in the first animal affected. Those that escape the disease were not predisposed to take it; hence their exemption.

Prevention. If the following excellent advice is followed contagious diseases may be prevented from spreading: Avoid contagium or special cause of the disease. Do not take the breath of one sick. Unless you are needed to care for the sick, or are protected by having had the disease, or in case of small-pox by thorough vaccination, do not go near the sick person. Do not allow your lips to touch any food, cup, spoon, or anything else that the sick person has touched or that has been in the sick-room. Do not wipe your face or hands with any cloth that has been near the sick person. Do not wear any clothing that the sick person has worn during, just before or just after his sickness. Keep your hands free from discharges from the body or skin of the sick person. Do not touch him with sore or scratched hands. Particularly avoid inhaling or in any way receiving into the mouth or nose the branny scales that fall off or peal off from one recovering from or apparently wholly recovered from scarlet fever.

Restrict the contagium or special cause of the disease. Isolate the sick. Separate those sick with any of these diseases, even if they are but mildly sick, from all persons except necessary attendants. A person sick with any of these diseases should not be permitted to suffer for want of care, food or comfort; but all his wants should be attended to by adults, or by those who are protected by proper vaccination or by having had the disease. Children and those who are not thus protected should be kept away from these diseases. Do not go from the sick-room to a child or other unprotected persons until after change of clothing, and thorough washing of hands, face, hair and beard. Always wash the hands thoroughly after any necessary handling of the sick person, or anything that has been in contact with the sick person. Keep those who have been exposed to any of these diseases away from schools, churches and other assemblies, and from all children until it is known whether they are infected —and if they are found to be infected, isolate them till after complete recovery and thorough disinfection.

Destroy the contagium or special cause of the disease:

1. By thoroughly disinfecting or destroying whatever is removed from the person sick or from the sick-room. All discharges from the patient should be received into vessels containing a strong solution of sulphate of iron (copperas) and then, in cities, thrown into the water-closet; elsewhere they should be buried at least 100 feet from any well; or where this is impractible they should be received on old cloths which should be immediately burned, disinfected or buried.

2. By thoroughly disinfecting the sick-room, and its contents, after removal of the sick person, whether by death or recovery. Disinfect as follows: Burn whatever has been in contact with the sick person and is not too valuable to burn. Garments, sheets, blankets, etc., that will not be injured by bleaching, should be boiled for half an hour in a zinc solution made by dissolving zinc sulphate and common salt in water, in the proportion of 4 ounces of zinc sulphate and 2 ounces of common salt to one gallon of water. Hang up and loosely spread out clothing, bedding, etc., that cannot be boiled in the zinc solution, or spread it loosely over chairs in the sick-room, leaving the bedstead and other furniture in the room. Close all openings to the room very tight. For a room ten feet square place 2 pounds of sulphur in an iron pot or pan supported on bricks. Set the sulphur on fire with live coals or with a spoonful of alcohol lighted by a match. Be careful not to breathe the sulphurous fumes. Leave the room tightly closed for several hours, then air it thoroughly. For a large room use a proportionally larger quantity of sulphur, at the rate of 2 pounds for each 1,000 cubic feet of air space, and try to burn as much as possible of the sulphur used.

Keep your house and premises, and everything connected therewith, clean; but remember that the contagium of these diseases may attach to the cleanest article of clothing, food, drink, book or paper if it is exposed thereto. For further advice see Disinfectants, and the respective diseases of man, cattle, horse, etc.

Contract, an agreement upon sufficient consideration to do or not to do a certain thing. There are three kinds: Parole, or written; by specialty, or under seal, as bonds, deeds, etc.; and of record, made by a person or his attorney in open court.

A parole contract is a verbal bargain. All contracts to be complete must bind both parties; must be based upon good consideration, motive, or inducement to make the promise, and not contrary to law or public morals. It is not complete until the proposition has been distinctly made on one side and distinctly accepted by the other, and by persons who are in turn capable of contracting. Persons under age, idiots and insane persons are incapable of contracting. Married women, in most States, over 21 years of age, make contracts in relation to their sole and separate property, not otherwise. Contracts must be made by the persons interested or by their authorized agent, acting within the scope of his authority. They may be made by letter or telegraph, and are completed when the offer is received and the letter accepting same is mailed, properly addressed to the person making the offer.

Implied contracts are such as reason and justice dictate, and which, therefore, the law presumes every man undertakes to perform; as, if a man employs another to do any business for him, or perform any work, the law implies that the former contracted or undertook to pay the latter as much as his labor is really worth.

Contracts for goods exceeding in value $50 require a partial delivery of the property or part payment of the purchase money.

Contracts for sale of land, or any interest in land, cannot be enforced unless in writing and signed by the person making the sale, or unless possession is given to the purchaser and valuable improvements made.

Contracts made payable at a particular place must be complied with at the place mentioned. If no place is mentioned in the contract the place of business of the person who is to receive the money—or, if he has no place of business—then at his residence, is the place understood.

Contracts obtained by fraud are destroyed by such fraud, if practiced by a party thereto or his agent.

CONTRACTING FOR REAL ESTATE. This is done usually by some offers passing back and forth until a price is mutually agreed upon; but it is not a legal contract which can be enforced unless there is an agreement in writing to sell, giving date, amount to be paid, a sufficient description to identify the land, a time fixed for compliance, and signed by the person who is selling or some one for him who is authorized in writing so to do.

The usual and better way is for the purchaser to make an offer in writing, stating terms and description of land. This is then accepted in writing upon the same or a separate piece of paper. This may be, and often is, done by letter, and if sufficiently explicit, will be binding. If an offer is made by letter or in writing and withdrawn before acceptance, it is not binding upon either party. But if the offer is made by letter through the mail and accepted, and letter of acceptance mailed before notice of offer is withdrawn, the sale is complete.

When the deed is not to be made at once, a bond for a deed is usually drawn up and signed by the seller. Never buy a piece of land unless the seller furnishes you a good abstract of title, showing a connected chain of title, free of judgments, mortgages, mechanics' liens, and taxes. A little care of this kind may save you from troublesome litigation and loss. If all the deeds necessary to complete the title have not been recorded, see to it that they are properly filed for record before paying your money.

Convalesence, a term applied to the time which elapses between the controlling of acute disease and the restoration of the patient to perfect health. This period of recovery is a most important time and often requires as much care as the disease itself; the body is weak, susceptible of impression, disposed to take on morbid actions, and, in some instances, a relapse into its previous state may occur from causes which in its healthy condition would not at all affect the body.

Convertible Husbandry, a term implying frequent change in the same field from tillage crops to grass, then back to tillage crops; an alternation of wheat, rye, etc., with fallow and grass crops. In all new countries mixed husbandry only comes to be carefully practiced as settlement increases, and markets are provided for various products. Mixed husbandry and manure are the best means of bringing exhausted land back to a state of fertility.

Convulsions. In children they originate in some derangement or irritation of the bowels, stomach, brain, or from teething. Give an aperient, as magnesia and rhubarb, and a warm bath at about 100°, and apply to the head linen dipped in cold water. The following powder is useful in altering the condition which brings them on: Rhubarb in powder, 8 grs.; supersulphate of potash, 12 grs. Mix. Give also a little syrup of poppies. If aperients cannot be taken give a mild injection, as a little Epsom salts in barley gruel, with a little butter; or a weak solution of salt and water, with a few drops of oil or butter. Convulsions often arise from over-feeding; this must be avoided. If indigestible food has been taken give an emetic, the wine of ipecacuanha; or, if the patient cannot be sufficiently roused from sleep so as to take the emetic, tickle the back part of the mouth with a feather to produce the effect. If the convulsions are obstinate, apply friction along the spine, when in the bath; or out of it, rub the spine with an anodyne composed of 10 drops of laudanum, 10 drops of oil, and 6 drops of tincture of cayenne. Mustard plasters may be applied a minute or two to the legs and feet. If convulsions are caused by teething, the gums must be lanced a little. If one falls in a fit let him remain on the ground, provided his face be pale; for should it be fainting or temporary suspension of the heart's action, you may cause death by raising him upright, or by bleeding; but if the face be red or dark-colored, raise him on his seat, throw cold water on his head immediately, and send for a surgeon, and get a vein opened, or fatal pressure on the brain may ensue. Give him all the fresh air possible and loosen all the tight places about his clothing. Put the feet and legs in warm water, apply spirits of hartshorn to the nose, and give a few drops in a glass of water, or hot brandy and water. If of a hysterical character, in addition to the foregoing treatment, bathe the temples with cologne water, and avoid bustle and excessive sympathy.

Cookery, the art of preparing food for the table. For some mysterious reason there is a popular belief in the absolute potentiality of all women, with or without instruction, to cook food in such a manner as will render it acceptable to the taste, and supply the proper nourishment. This belief is wholly unfounded. The art of cookery is as high and complicated as landscape and portrait painting, or sculpture; and probably these three arts require more skill than any other within the whole domain of human power. To be good in any specialty, in any department of human life, one must have both natural endowment and practice.

It is true that the average woman does possess the elements essential to culinary excellence—patience, nice sense of taste and smell, and that superior intuitive judgment which enables her to unravel such mysteries as "seasoning to taste" and "adding enough flour to make a good dough," but unless these elements are brought into homogeneous accord by actual experimentation, they are neither more nor less than theoretical nonentities. With earnestness of purpose and absolute concentration of mind upon her task, the woman who would cook must give herself up to serious study under competent instructors; and it is safe to say, that while by this means only the exceptional woman will rise to greatness, the average woman will achieve a measure of success which will fit her to shine as the care-taker of a household. The daughters should early be taught the art of properly preparing dishes. Many of the girls, even of the farm, grow up with their latent talent undeveloped.

Cookery is of two kinds, simple and refined, or compound. The object of the first is either to destroy some deleterious property or to render food palatable and nutritious. That of the second is to stimulate appetite and please the palate, an end sometimes attained by fantastic and unwholesome compositions. The general modes of cooking are as follows:—1, roasting; 2, boiling; 3, stewing; 4, broiling; 5, frying; and 6, baking. By roasting a greater quantity of nutritious matter is retained in meat than by any other process of cookery except that of boiling. The perfection of this process consists in doing the meat neither too rapidly nor too slowly. By the last method it is withered, by the other burned or scorched, and by either rendered unnutritive and indigestible. Meat to be wholesome should neither be over or under-done. By over-dressing meat, as its fluids are expelled by the heat and the fibres compelled to approach closer to each other, it is rendered indigestible; by its being under-dressed it runs quickly into putrefaction. The perfection of roasting consists in the medium between over-dressing and under-dressing, namely, in the meat being well done, when it will eat short and agreeable and be in its most nutritive state. The flesh of old and full-grown animals is not unwholesome if eaten rather under-done; but young and viscid food, as veal, lamb, pig, chicken, etc., should be thoroughly cooked, or it will disagree with the stomach and probably occasion sickness. Such food is also more wholesome and nutritious and more easily digested when roasted than when boiled. Boiling renders meat more tender than roasting it, but it deprives it of more of its nutritive qualities. Boiled too long or too fast meat becomes hard and indigestible; besides, all its nutritive qualities are lost or dissipated in the water. Meat boiled in hard water is more tender and juicy than when soft water is used; while vegetables, on the contrary, are rendered harder and less digestible when boiled in hard water. Boiling is the best process for dressing vegetables, as they are thereby rendered more soluble in the stomach, and are deprived of a considerable quantity of fixed air. By stewing, meat is rendered more tender than any other process of cooking; but as more of its soluble parts are extracted than is the case with the other processes, the only good aliment that it affords is the soup, for though the meat is rendered sapid, it is hard and less nutritious. By broiling meat more of its nutritive qualities are retained than by most other processes, for the evaporation or exhalation of the juices of the meat is prevented by the sudden hardening or browning of the surface. For imparting strength it is therefore the best mode of dressing animal food, as it is thereby rendered more nutritious and easier of digestion than by any other preparation. Frying is the most objectionable mode of dressing any species of food, as it is rendered highly empyreumatic by the heat being applied through the medium of burning oil or fat. Baked meats are not unwholesome for occasional use; but from the retention of their oils, occasioned by the confined space in which they are dressed, they are not so digestible and nutritious as roasted food is. On this account those who are subject to dyspepsia or biliousness when they partake of this species of food, should assist the powers of the stomach by the additional stimulus of spices and aromatics, and they should abstain from its gravy, as it is highly empyreumatic. If by this restraint the meat should not be sufficiently savory, by pouring boiling water over it on the plate a wholesome and sapid gravy may be obtained.

We very fully treat of the cooking of all the various articles of food under their respective heads, but we wish to give the following general principles of cooking in this connection:

1. Plain cooking is more popular and satisfactory than fancy.

2. It is always better to under-season than over-season.

3. There is generally too much grease cooked into the victuals.

4. When anything is accidentally made too salt, the evil can be greatly counteracted by adding a teaspoonful each of vinegar and sugar; but a dish doctored in this way creates a great deal of thirst in one who eats of it.

5. The more uniform the heat the better the cooking.

6. Baking should be done with as great a heat as possible not to burn the article.

7. Boiling of meats should be done slowly, a steady simmer being the best.

8. It is not good to be frequently opening the oven doors during the process of baking, unless want of skill, especially with that particular stove, necessitates it.

9. The softer the water the more tender can the meats and vegetables be boiled.

10. Meats should not be washed, but wiped with a towel.

11. Vegetables should always be as fresh from the garden as possible.

12. All vegetables are rendered more bland by par-

boiling, but this process takes away some of the nutritive elements.

13. To retain the color of any vegetable, plunge it into cold water immediately after boiling.

14. In boiling cabbage and turnips, a lump of charcoal in the pot will counteract the bad odor coming out into the room; and in boiling greens, a little piece of bread tied up in a clean cloth, and put into the kettle, will absorb most of the odor.

15. Study the various recipes given in this volume, and endeavor to conquer all difficulties in the management of each dish.

French cookery is characterized by cooking into the victuals the flavor of the spices and condiments without the crude matter of the spice itself. This is effected by placing the spice or condiment under or near the article of food, in the same vessel. Skill in this art produces very fancy and palatable flavors, besides retaining the hygienic quality of the food.

To arrange dishes for the most economical distribution of them for several meals in advance, working over scraps, remnants, etc., requires constant thought. Printed suggestions and programmes are of but little use with most people.

Many housekeepers are not aware of the rapidity and constancy of the oxidization of iron, copper, brass and tin (soldered) vessels when in contact with moisture, or the amount of such poisonous oxides that enters the food that is eaten, or, further, of the extent of the mischief which such poisons effect in the system. Impurity of the "blood," poverty of the blood, paleness and emaciation or floridity and corpulency, and a general liability to any and all diseases, are the natural results of consuming articles of food in which these oxides and salts are found. Hence the importance of keeping all these wares clean; and in order to keep them clean, they should not only be washed and scoured immediately after they are taken from the fire, but should also be thoroughly rubbed, while hot, with a cloth dipped in fresh grease or oil of some kind, in order to prevent the moisture of the air from rusting them. Even then they should be kept in a dry place. Pure tin does not rust; but the soldered seams of all tinware are coated with a poisonous compound of lead, which is very deleterious to the human body. It is better to use granite-ware altogether, or boiling and stewing should be generally superseded by baking and steaming.

The articles of equipment in the kitchen and dining-room will be found enumerated under the head of Kitchen, and in this work each article of cookery is placed in its alphabetical order, thus: Biscuit, Bread, Buns, Cake, Cheese, Chowder, Cobbler, Cracker, Creams, Custard, Dessert, Doughnut, Dumpling, Eggs, Float, Fritter, Garnishing, Gravy, Greens, Gruel, Hash, Hominy, Hulled Corn, Iceland Moss, Jam, Jelly, Marmalade, Muffin, Mush, Pancakes, Pickle, Pie, Porridge, Preserves, Pudding, Roll, Roulette, Rusk, Salad, Sausage, Soup, Succotash, Tart, Toast, Waffle, and the various meats, fruits, vegetables and beverages.

COOKING FOOD FOR STOCK: see Feed, Steaming and Cooking.

Co-operation, working together. In farming, this is necessary for the following purposes, in the order of their importance: 1, Destroying insects and weeds; 2, Preventing contagious diseases; 3, Draining, fencing and roads; 4, Use of large machinery, too expensive for every farmer to buy; 5, Competition against high freights; and 6. Mutual instruction and lecture courses.

Coping (co' ping), the highest or covering course of masonry in a wall, often with sloping edges to carry off the water: sometimes called "capping." Stone coping upon brick work is highly ornamental, and is in almost universal use.

Copper Vessels, to keep from rust: Dip them in very dilute nitric acid, and then immerse them in linseed oil; let the excess of oil drain off. To clean copper vessels, first wash them with hot water, to remove all grease, then rub them with a mixture of pulverized rotten stone, soft soap and oil of turpentine; make this mixture stiff as putty. Hard solder for copper: melt together copper, zinc and tin.

As antidotes for poisoning by copper oxide, verdigris, etc., administer iron filings; also white of an egg (albumen), which forms with copper a compound insoluble in water. Apply the stomach-pump.

Cordial, in medicine, that which stimulates the nervous system and cheers up the spirits. To form the basis of cordials the following materials are employed: Rain or distilled water, white sugar, and clean, perfectly flavorless spirits. To these may be added the substances from which the flavor or aroma is extracted, which distinguish and give character to the particular cordial to be made, and also the article employed as "finings," when artificial clarifications are resorted to. In the preparation or compounding of cordials, one of the first things is to produce an alcoholic solution of the aromatic principles which are to give them their peculiar aroma and flavor. This is done by simple infusion or maceration, or by maceration and subsequent distillation, or by flavoring the spirit with essential oils. In the preparation of liquors, glycerine is admirably adapted for preserving the characteristic flavors of those compounds.

BLACKBERRY CORDIAL. One quart of blackberry juice, 1 pound of white sugar, ½ ounce of grated nutmeg, ½ ounce powdered cinnamon, ¼ ounce allspice, ¼ ounce of cloves, and 1 pint best brandy. Tie the spices in muslin bags; boil the juice and spices together fifteen minutes, skimming well; add the brandy; set aside in a closely vessel covered to cool. When perfectly cold, strain out the spices, and bottle, sealing the corks.

BLACK-CURRANT CORDIAL. To every four quarts of black currants, picked from the stems and lightly bruised, add 1 gallon of the best whisky; let it remain four months, shaking the jar occasionally; then drain off the liquor and strain. Add 3 pounds of loaf sugar and ¼ of a pound of the best cloves, slightly bruised; bottle well, and seal.

Coriander (co-ri-an′der), an aromatic plant of the parsley family, growing about two feet high, and bearing fragrant seeds which are often used in flavoring confectioneries and in medicines. In the latter capacity it is a stomachic—expelling gases from it, easing it from distention, and settling the nerves in connection with that organ. It is an excellent medicine for young calves having weak stomachs. The bruised seeds should be given in 2-dram doses, in milk. The seeds are globular, brown, and about a sixteenth of an inch in diameter. The plant is easily raised throughout the United States, and is found in some old-fashioned gardens.

Cork. To get a cork out of a bottle when it is entirely inside, drop a string into the bottle, holding both ends on the outside; turn the bottle top down and move it about until the loop of the string surrounds the cork, when the latter can be drawn out by force

Corking. Procure good, soft, velvety corks, free from large pores, and large enough to be extracted without the use of the corkscrew. In effervescent wines, such as champagne, gooseberry, etc., use the very best corks; and after placing them securely in the neck or mouth of the bottle, tie with a good strong string or wire.

Cork-Screw. This is a little convenience which should be in every household. A substitute may be improvised by taking a common screw with a string attached to it to pull the cork; or, two forks stuck into the cork vertically and a knife inserted between the two. Give a twist, and out pops the cork.

Corn. In the United States this name is applied only to Indian corn, or maize. In Europe the word "corn" is understood to mean the various cereals, or grain in general. It is a member of the grass family, botanically, and with reference to its value as an article of food it rivals rice and sugar-cane with the human family at large; and in our own country it exceeds wheat in money value, and in number of bushels is four times as great. It is a most important article of food, both to man and beast, and to the poor of the South is verily the staff of life, where it is used more extensively as human food than in any other part of the world. The origin of Indian corn has been a source of much controversy; and although there has been much written on the Eastern origin of it, yet it is certain it did not grow in that part of Asia watered by the Indus at the time of Alexander the Great's expedition, as it is not among the productions of that country mentioned by Nearchus, the commander of the fleet. Neither is it noticed by Arrian, Diodorus, Columella, or any other ancient author. And even as late as 1491, the year before Columbus discovered America, Joan di Cuba, in his "Ortus Sanitatis," makes no mention of it. It has never been found in any ancient tumulus, sarcophagus or pyramid, nor has it ever been represented in any ancient painting, sculpture, or work of art, except in America. But in this country, according to Garalaso de la Vega, one of the earliest Peruvian historians, the palace gardens of the Incas were ornamented with maize in gold and silver, with all the grains, spikes, stalks, and leaves; and in one instance, in the "Garden of Gold and Silver," there was an entire corn-field of considerable size, representing the maize in its exact and natural shape, a proof no less of the wealth of the Incas than of their veneration for this important grain. In further proof of the American origin of this plant, it may be stated that it is still found growing in a wild state, from the Rocky Mountains in North America to the humid forests of Paraguay, where, instead of each grain being naked, as is always the case after long cultivation, it is completely covered with glumes or husks. It is moreover a well authenticated fact that maize was found in a state of cultivation by the aborigines on the Island of Cuba at the time of the discovery by Columbus, as well as in most other places in America first explored by the Europeans.

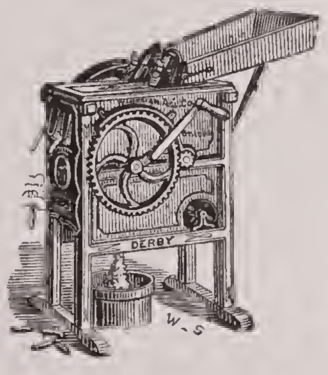


Fig. 1.—*Derby Sheller.*

The first successful attempt of the English in North America to cultivate this grain was made on James river, in Virginia, in 1608. The colonists sent over by the "London Company" adopted the mode then practiced by the Indians, which with some modifications has been pursued ever since.

Cultivation. The soil for corn should be rich, mellow, and well-drained. Land can scarcely be too rich for it; and the fresher and less fermented the manure is which is applied to it the better, unless on light, sandy soils. A clover lay or rich grass sod is an excellent preparation for corn. The manuring should be broadcast, for if it is confined to the hills the corn will come forward early and throw out an abundance of roots, which will not find support at a little distance from the stalk, and thus become impoverished later in the season. Plow in the fall, as you have more time then. Gypsum is the best fertilizer. The selection of seed should be made with the utmost care, not only from the best varieties, but also the best seed of the particular kinds desired. Some of the choicest varieties have been brought to their present perfection by selecting only the earliest and largest ears from the most prolific stalks. This ought always to be done before the corn is gathered in the field where there is an opportunity for comparison. In small fields, where there is a dense population, and where planting is done by hand, it will prove remunerative to steep the corn in a solution of saltpeter or copperas (¾ lb. to water enough to cover a bushel of corn) for one or two days before planting. This accelerates the growth of the plant and is a protection against birds, squirrels, and mice, and for a while it will keep off worms. To keep off the depredators, it has been advised to coat the seed corn with boiling tar (half a pint of tar to a peck of corn). The use of excellent corn-planting machines at the present day is a great improvement on the old methods, considering the time required to put in a crop and the quality of the work; and their use has also superseded many of the old-fashioned modes which still might be preferable in the small acres of the densely-populated East. Check-row planting enables one to give cleaner cultivation, and this system is generally advised. See article Corn-Planter. By this plan the hills are three to four feet apart, and three to five stalks are allowed to the hill. The fewer the stalks, to a certain limit, the larger the ears. In drill planting the grains are dropped 18 inches apart, in rows three to four feet apart. The amount of seed per acre will be in proportion to the richness and dryness of the soil. Thick planting, other things being equal, gives fewer and smaller ears. A good old rule as to the time of planting is when oak-leaves have attained the size of a squirrel's foot. The average depth of planting should be about two inches, but the earlier the time, or the wetter the soil, the more shallow. Late in the season, or when the soil is very dry, the corn may be covered three inches deep or more. The rolling of the ground can be done before planting or immediately after. As soon as the corn is up the ground should be stirred by a cultivator (see Cultivator), and this process repeated every week or two until the ground is well shaded by the corn, even during the driest seasons, by which time the corn will be three or four feet high. Of course, the ground should never be touched when in a pasty condition, but only when it is pulverizable. The Western method of cultivation generally supersedes the use of the hoe. Wet weather delays cultivation and gives the weeds and grass the advantage, especially on flat land. Very flat ground should not be planted to corn, but rather seeded in grass and clover. Heaping the earth around the hills should be avoided, except with very heavy or wet soil, and, except so far as necessary, to smother small weeds in the hill—the plan generally followed in the West to supersede hoeing.

A man in Central Illinois reports that he raised ten bushels per acre more than his neighbors with less than the usual amount of cultivation, by the following method: He did not touch the ground until the first growth of weeds appeared. The ground was then plowed to the depth of three inches, and left in this condition until the second crop of weeds appeared, when it was again plowed a few inches deeper. It remained thus until the last of May, at which time it was plowed as deep as his teams could plow it, and immediately planted. The season being favorable for the pulverization of the soil, the ground was in excellent condition at the time of planting. Nothing further was done in the way of cultivation. The shallow plowings, instead of deep, saved his team. But deep culture, late in the season, on the other hand, tears up the roots and injures the corn. The prevailing sentiment is to plow deep early in the season, and shallower toward the time of laying by. On grass or sod land, manure the land in August before the sod is turned; the following spring, very soon after the usual corn-planting time, turn the sod flat, with a depth of seven inches, following with a subsoiler as deep as possible; heavily roll the land, and, if the greatest possible yield is desired, manure heavily with guano or hen manure, say 200 pounds to the acre, or 300 pounds of cotton-seed meal, or some equivalent; then harrow longitudinally with the furrows until there are at least two inches of pulverized soil upon the surface; then plant.

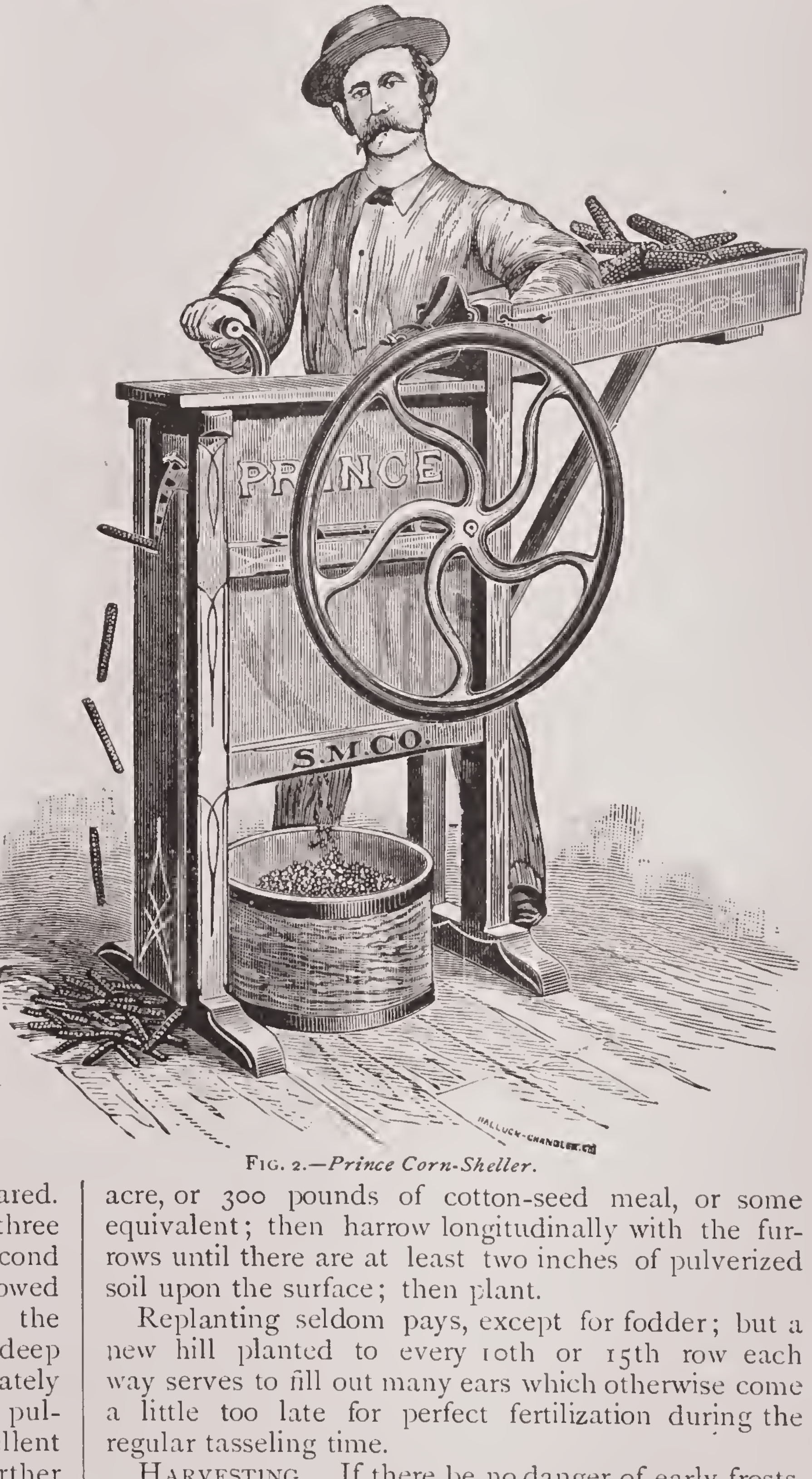


Fig. 2.—*Prince Corn-Sheller.*

Replanting seldom pays, except for fodder; but a new hill planted to every 10th or 15th row each way serves to fill out many ears which otherwise come a little too late for perfect fertilization during the regular tasseling time.

Harvesting. If there be no danger of early frosts, the corn may be permitted to stand until fully ripe. If the stalks are desired for fodder, they are better to be cut as soon as the grain is well glazed, and this should be done in all cases when frost is expected. If the corn be shocked or stooked, scarcely any injury will occur either to the leaf or grain. Very few cultivators now-a-days advise "topping" the corn; that is, cutting off the stalks above the ear; and stripping the blades is too tedious a process of making fodder. Corn should be permitted to stand in the field until perfectly dry before stowing away in the crib. The last days of September and the beautiful "Indian summer" of October is the regular harvest time for corn, but often a farmer is so situated that he can best afford to let the corn stand on the stalks until it is fed out, which saves once handling. "High" farming and the best-paying farming are often two different things. But picking corn in the winter is so painfully disagreeable that most people would prefer to "handle the corn twice."

Considering that hills of corn in the right place are often insufficient for holding up a shock, a "corn-horse" (Fig. 3) can be easily made, by which one can locate the shock just where he wants it without anxious thought or care. The figure represents the "horse" set for a shock; the corn is put around the intersection of the pin as a center, and when done, the pin, (which fits loosely) is drawn out, and the main pole drawn out at right-angles to that, and the horse carried to the next locality for a shock. In husking the corn at a subsequent time, and in removing the fodder from the ground, the farmer is thus relieved of the torments of tugging at uncut stalks and of then cutting them with his pocket-knife. In every way the "corn horse" method is the neatest and best.

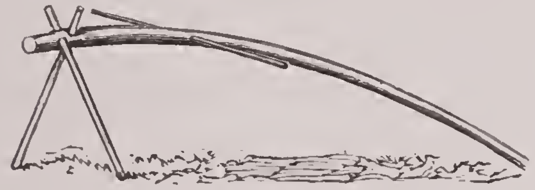


Fig. 3.—*Corn-Horse.*

"Hogging down" corn is the practice of turning hogs into the corn-field to fatten themselves. This is not advisable, as systematic experiments show that under such a regime the land actually decreases in productiveness, breaks up cloddy in the spring, and becomes difficult to cultivate neatly.

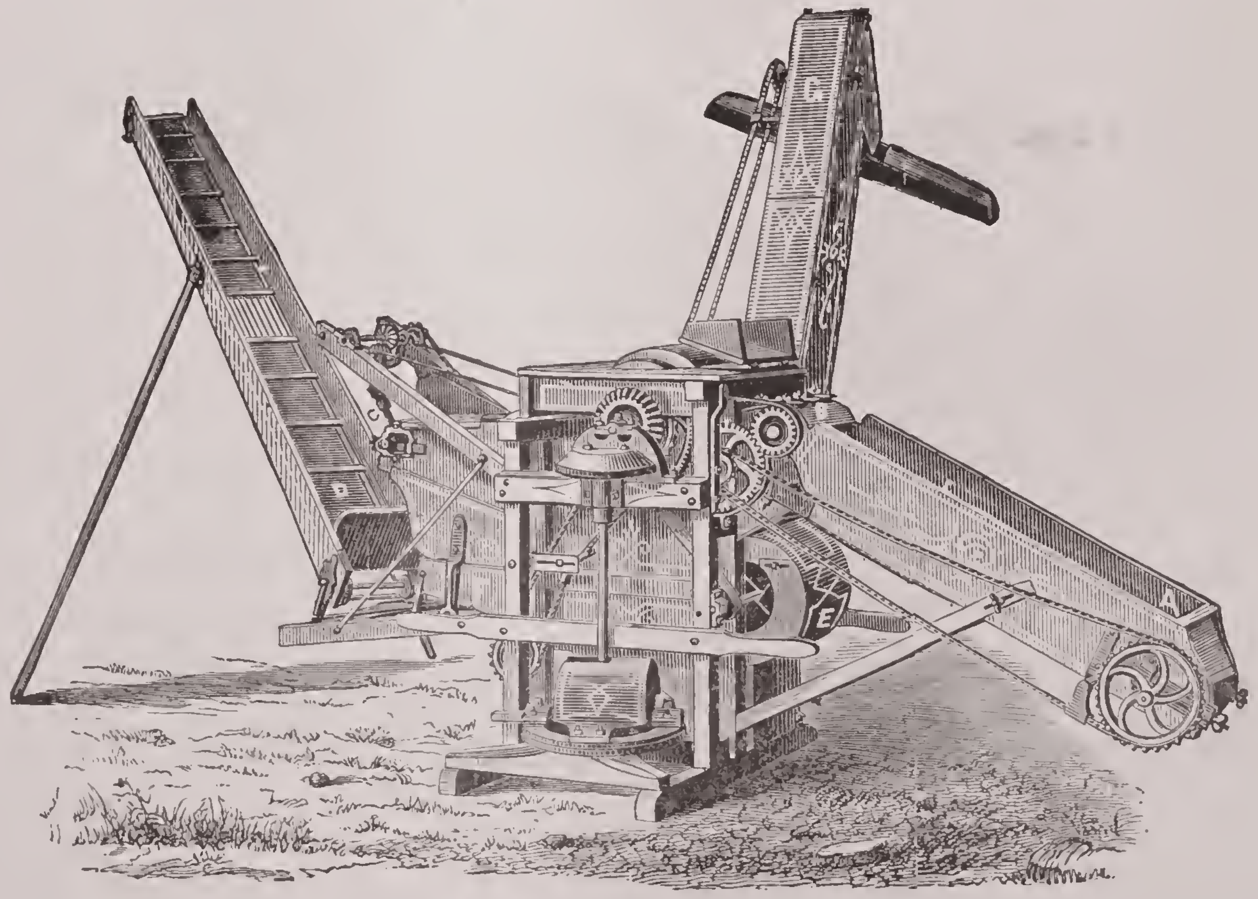


Fig. 5.—*Warehouse Sheller in Position for Work.*

As to the amount of shrinkage of corn, systematic experiments have been made, showing that it is better, on an average, to sell shelled corn early in the winter at 40 cents than the following summer at 50 cents. The degree of shrinkage varies, of course, with the kind of weather, the kind of corn, the degree of ripeness at the time of harvesting, etc. Ears from even the same hill will vary to some extent.

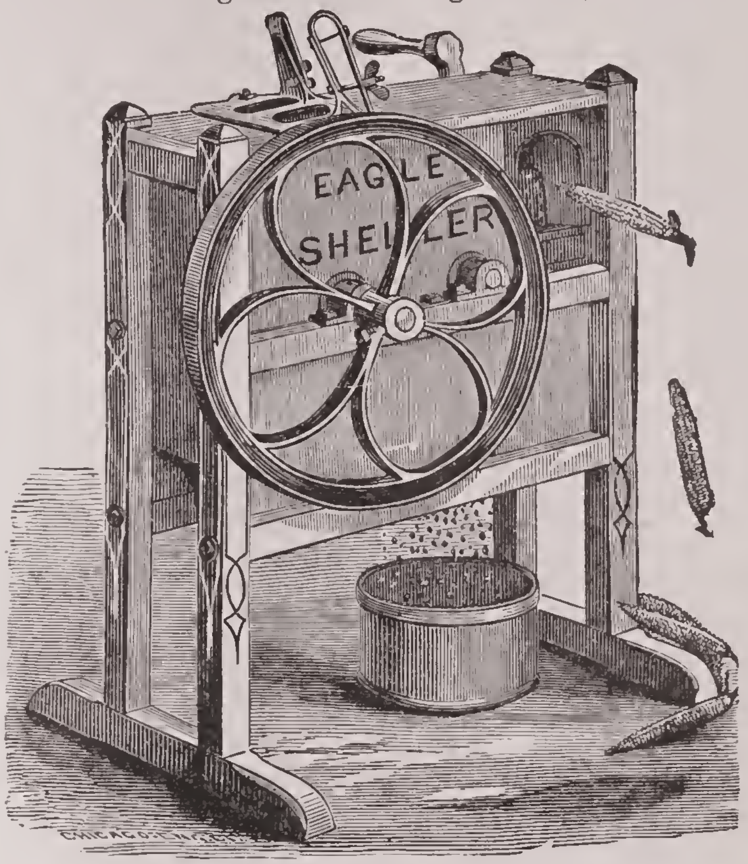


Fig 4.—*Eagle Corn-Sheller.*

The relative cost of corn and pork is indicated in the following table of equivalents, the corn at a given price per bushel being equivalent to pork at a given rate per pound:

CORN.	PORK.	CORN.	PORK.
12½	1⅞	33	4
17	2	45	5
25	3	60	6

From this schedule any farmer can readily calculate whether to sell his corn or first turn it into pork, as nearly as he can forecast the markets.

Sometimes a piece of ground is sown thickly with corn for fodder or soiling. For this purpose the soil should be in a high condition and well pulverized. Prepare the seed in a pickle of saltpeter, like that intended for ripe corn; sow it broadcast at the rate of three or four bushels to the acre, and harrow it in. A better method is to sow thickly in drills and stir the ground with a light plow or cultivator. Some prefer even the hill method—twice as many hills to the acre as for grain. The sowing may be either early or late, but early is better. Cut before frost, dry thoroughly and then house it.

Seed Corn. The best method of saving seed in ordinary cultivation, and that is convenient for every farmer, is to select the ears while cutting the corn. Lay the stalk and the ear one side, and these can be easily gathered and placed in a shock by themselves; husk this corn early, throwing aside any that does not come up to the standard. Leave two or three husks on the ear, then braid together 12 or 15 ears and hang in any convenient place under cover where the air freely circulates. It will be well dried before cold weather, and should be put where it does not freeze hard. Such corn will not fail to grow; and not only that, it will give a strong plant, and the selection of choice ears will constantly increase the crop, provided the soil and cultivation is attended to. These remarks will apply equally to other grains, although the trouble is not as great with the small grains as with corn. In the West, however, where all the corn is picked from the stalk, it is more convenient to select the best ears while harvesting the corn in October.

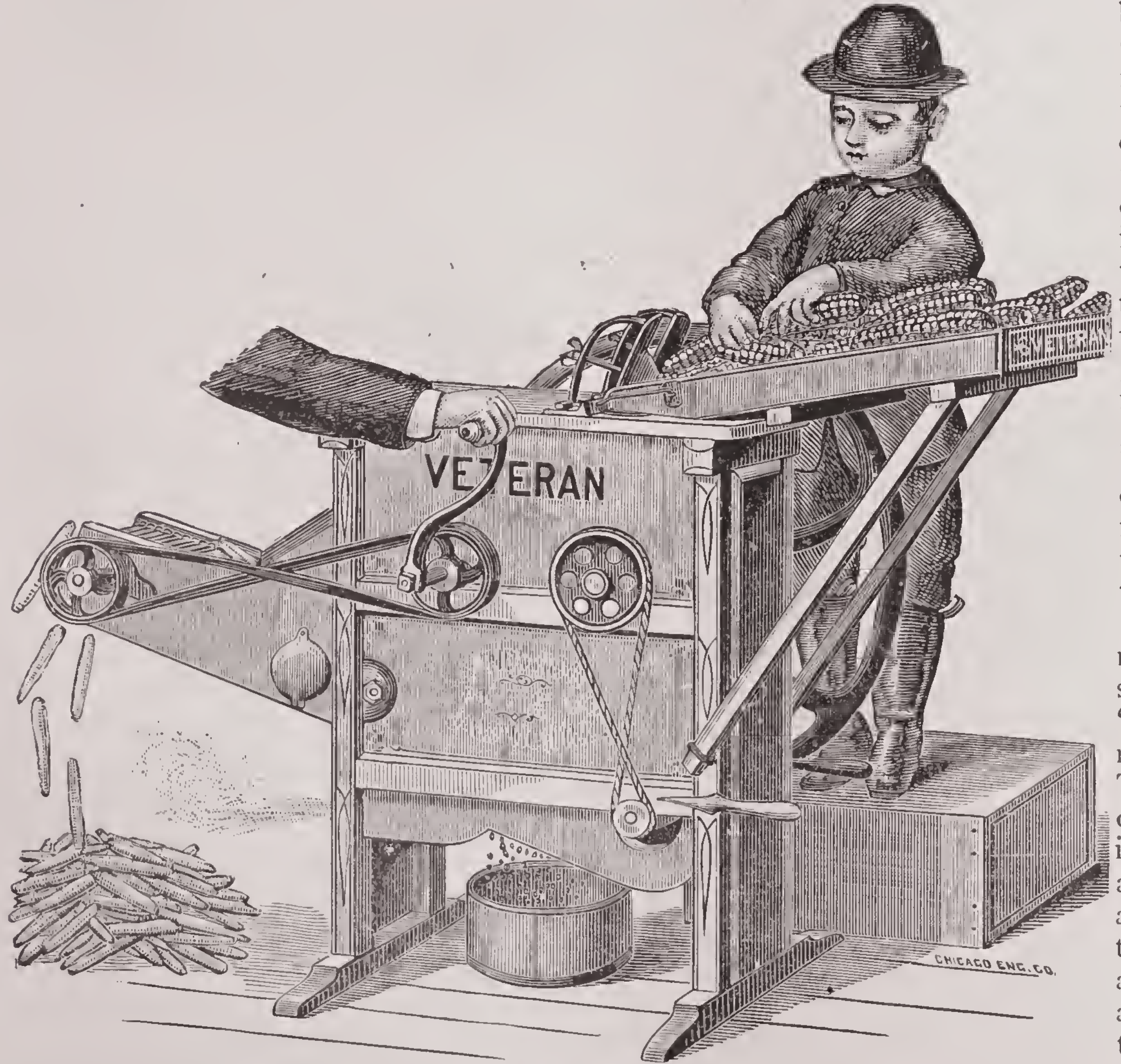


Fig. 6.—*Veteran Hand-Sheller.*

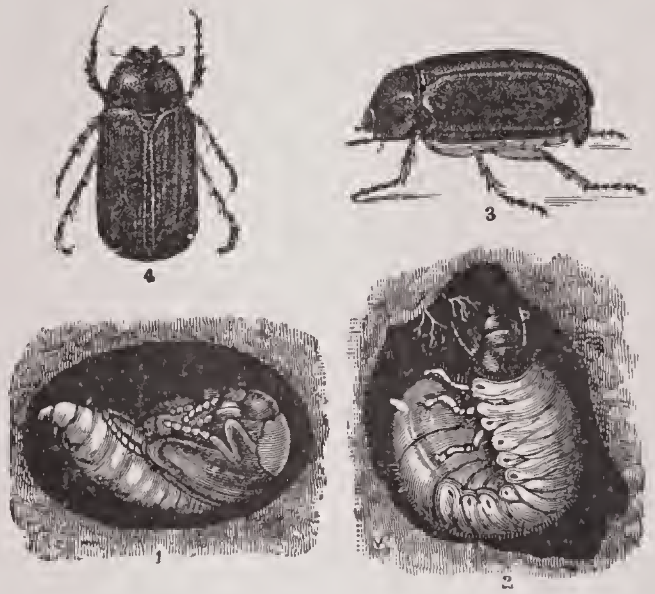


Fig. 7.—*May Beetle* (Phyllophaga fusca).
1, pupa; 2, larva; 3, beetle, side view; 4, beetle, back view.

Diseases. Indian corn is not subject to any disease, strictly speaking, except the "smut," a fungoid growth familiar to every farmer. The only remedy consists in cutting off and burning all infested parts as soon as they appear. Thorough co-operation of farmers would render this process more effectual, as the spores of the fungus are readily transmissible by the winds. Such tedious work, however, is seldom remunerative, except in very extraordinary cases.

Insects. The chinch-bug and army-worm do corn a great deal of damage, but as they injure wheat rather more, we take them into consideration under the head of Wheat. The cut-worm, or white grub, which is the larva of the May beetle, Fig. 7, works on the corn as it is sprouting and appearing above the ground.

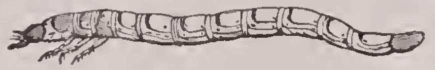


Fig. 8.—*Wire-Worm* (Elater).

The wire-worm, Fig. 8, is the larva of the spring beetle (Fig. 9), called also "click beetle," "skip jack," "snapping bug," etc. It eats the roots, the stem and finally the ear. It works also upon wheat and some of the grasses. As remedies for the cut-worm and wire-worm, all sorts of drugging of the soil have been recommended, from salt to lime and ashes, but with doubtful results.

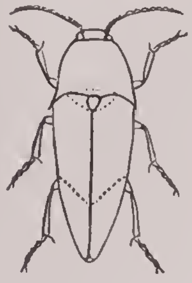
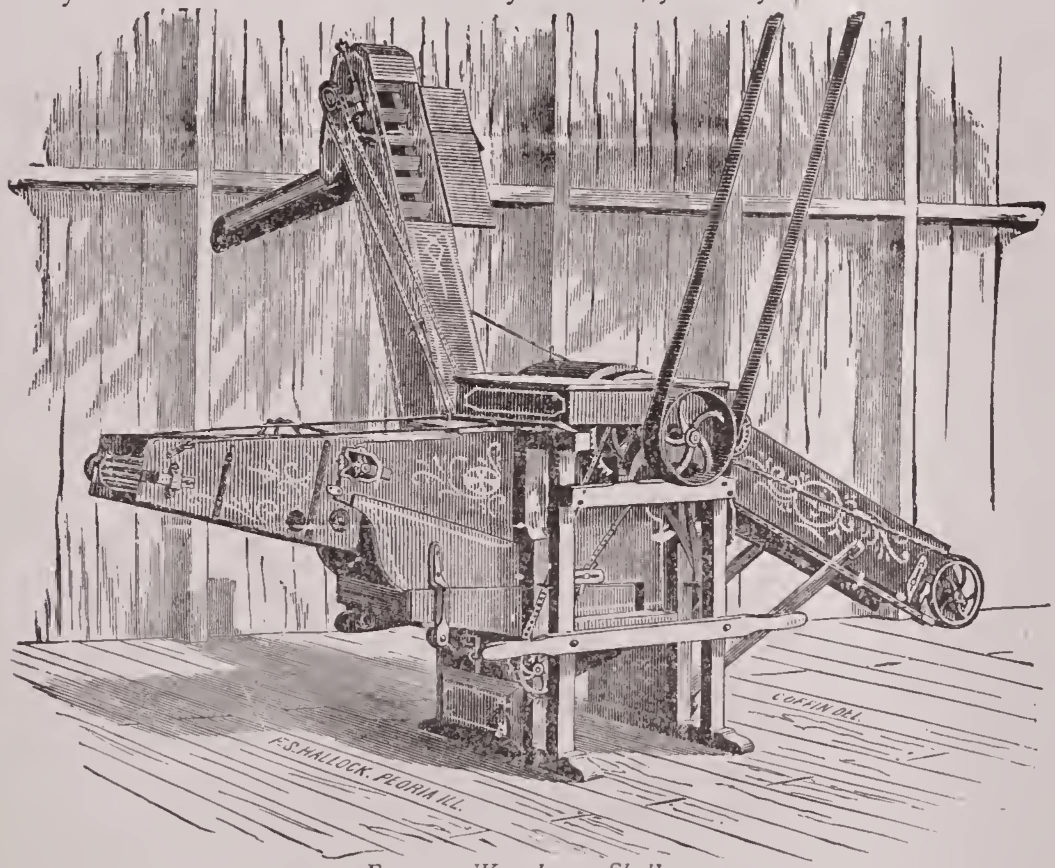


Fig. 9.—*Spring Beetle.*

"Fire and flood" are sure remedies, when they can be applied, which is seldom—namely, burning up all rubbish and remaining stalks in the field, as well firing the neighboring forests, with co-operation of neighbors, and irrigation, where practicable. But the most reliable method of all is to starve them out by omitting to plant for one season, frequently stirring the ground. Previously soaking the seed in drugged solutions, or tarring it, or both, probably aid in guarding the grain in the ground, but is no protection to the stalk or ear. The birds and domestic fowls do not reach these worms to any appreciable extent. It is very hazardous to re-sow where these worms have destroyed a crop unless the soil be plowed repeatedly. They are most to be dreaded in dry seasons, yet they cannot exist without some moisture.


F.S.HALLOCK. PEORIA ILL.
COFFIN DEL.
Fig. 10.—*Warehouse Sheller.*

Affected plants are known by the dying off of the outer leaves. They cut into the stem above the roots and sometimes separate the stalk. Gardens suffer exceedingly; lettuces often fall a sacrifice to them. On light lands they do most mischief from the beginning of March to June.

Fig. 11.—*Monitor Sheller.*

Lower parts of the fields joining on marshes are much infested. Rye-grass is most dangerous with clover for encouraging wire-worms. Gravelly and sandy soils are most infested; strong loam and clay most free from them. Wheat sown in dry weather is most likely to suffer. By constantly disturbing the insects it is probable they may be driven from a locality. A summer fallow and burning the rubbish are recommended after clover and grasses; it kills the eggs and starves the worms; but fallows must be kept very clear from grasses and weeds. Nothing more dangerous than to leave strips and patches of grass or lays in plowed fields. Feeding land close with sheep will prevent the eggs from being laid. Folding oxen and sheep in the spring may also keep the beetles from coming out of the earth. Harrowing and hard rolling in March and April are strongly recommended. Top dressings of lime are useful before rolling.

A great many other insects are found infesting corn, as the Rocky Mountain locusts (see Locust), the rustics, plant lice, etc., for which the remedies are in general the same as already designated for the cut-worm and wire-worm.

Many birds, squirrels, gophers and mice also "go-for" corn, all of which have to be warred against in all imaginable ways, as there is no single remedy known that is thoroughly effectual in their destruction or in driving them off. A small mirror or piece of bright tin suspended on a pole so as to swing around in the wind, is said to be an efficient scare-crow.

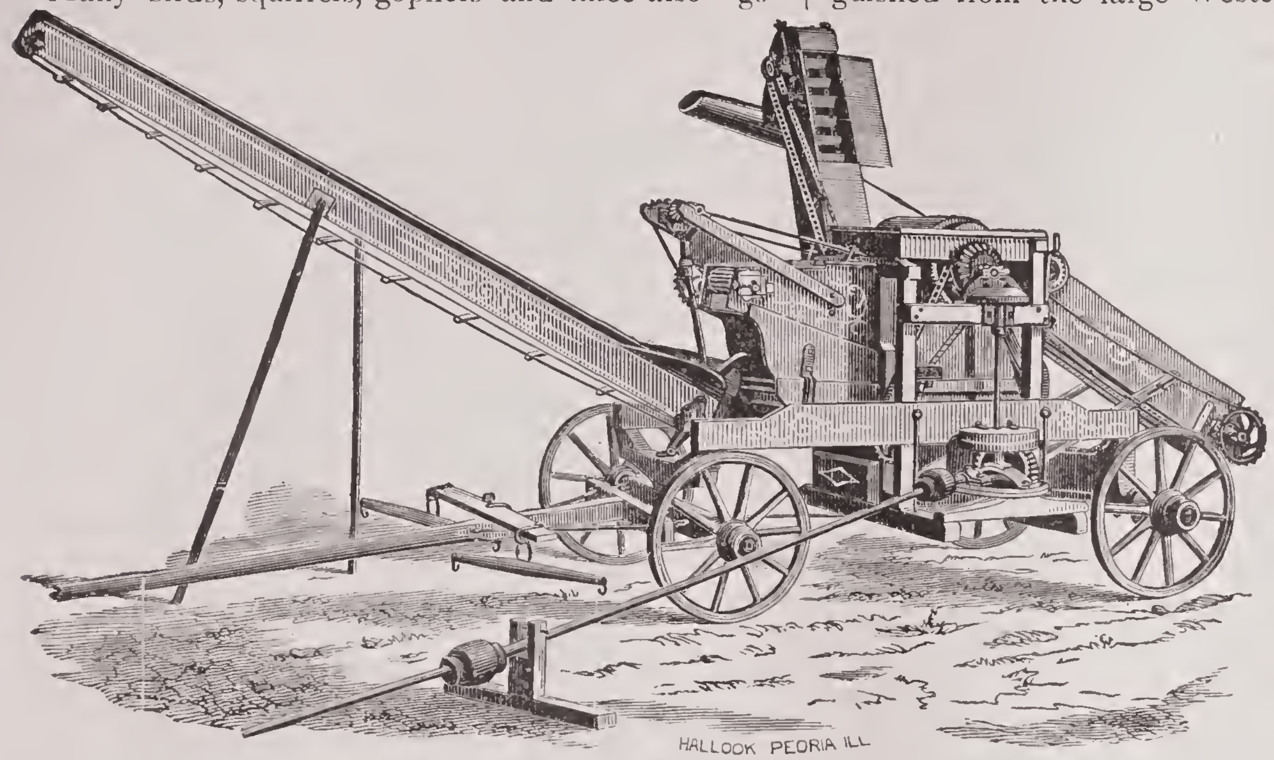


Fig. 12.—*Geared Mounted Sheller.*

Varieties. In reality there is but little pure-bred corn in this country, for crossing is so easy that nearly all our so called "varieties" are sub-varieties, mostly with local names. Corn readily adapts itself to the latitude in which it grows, changing its characteristics with change of locality. Varieties considered early and small in Maine, planted a few years in Tennessee, become late and large, thus completely adapting themselves to the warmer climate. Indian corn may properly be divided into four distinct groups: The Flint corn of the sea-coast States, the Dent corn of the West and South, the sugar varieties, containing gum, sugar, oil and but little starch, and the Squaw or flour corn. The latter are marked by their tenderness, the skin being filled with starch granules, which readily break into powder. The flint varieties contain largely of gum and oil, and the Dent varieties as largely of starch and oil.

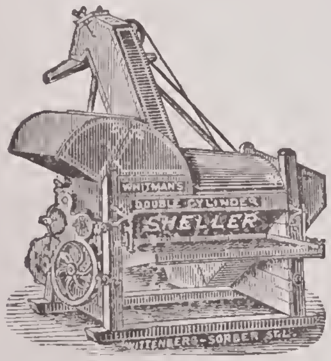


Fig. 13.—*Double-Cylinder Sheller.*

The small flint, or hard, 8 to 12 row varieties are grown principally along the north border States, from Maine to Oregon. Among these may be mentioned as best the Early Yellow Canada (small eight-row), Holden (same, but more productive), and Kingsbury's Excelsior, an early 12-row, yellow variety, growing larger every way than the others. These may be designated as types of the Northern varieties, as distinguished from the large Western and Southern Dent varieties. Among the latter are the Early Galena (one of the best for late planting), Early Minnesota, White Gourd Seed, Southern Big Yellow, Illinois Yellow, Long John, Evans, Proctor Bread, Chester County Mammoth, Chester County Gourd-Seed, Brunt's Prolific, Longfellow, etc. We notice in the State agricultural reports many other names of varieties, but they are either local or synonymous with the names above given. The same variety appears different as grown in different situations. We need a thorough overhauling and systematizing of corn nomenclature.

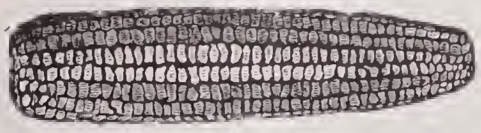


Fig. 14.—*Chester County Gourd-Seed Corn.*

The stalks of all the varieties are rich in sugar when the grain is in the milk, so much so that sugar in notable quantities has been produced therefrom, not however in quantities to warrant working it, since, in the South, the true sugar-cane and in the North the varieties of sorghum are more profitably worked.

In planting Sweet Corn, for table use, the smaller varieties may be sown in drills two and a half feet apart, and the stalks thinned to ten inches apart; the largest sort should have the drills three to four feet apart, the stalks a foot apart in the rows, and the very largest varieties eighteen inches apart. Use some rich manure in the drills, frequently stir the earth around the roots by hoe or cultivator, but do not draw it up about the stalks. For a succession of corn for family use to be planted at the same time, the best varieties probably are Marblehead Early, Extra Early Adams, Pratt's, Crosby's, Moore's, Stowells, and Egyptian Sweet.

Varieties. The sweet varieties for family use and marketing in a green state are the following:

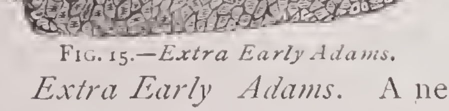


Fig. 15.—*Extra Early Adams.*

Marblehead Early. The earliest of all.

Extra Early Adams. A new variety.

Pratt's Early. Best early variety for market.

Crosby's New Early. First-rate every way.

Moore's Early Concord Sweet. A new early corn, with 12 to 16 rows; remarkably handsome and quite popular.

Campbell's Early. Popular in Ohio.

Stowell's Evergreen. Keeps green till cold weather; ears large; a standard late variety.

Marblehead Mammoth. The largest variety grown; early and sweet.

Early Narragansett. Kernels very large and ears large and short.

Mexican Sweet. The sweetest and tenderest of all varieties for family use.

Golden. Peculiarly rich flavor; forty days; a good flint variety for an early crop in Northern latitudes.

Early Boynton and Egyptian are new varieties promising to supersede some of the old.

Gen. Grant. The sweetest of all and best for fodder; latest of all.

Sweet Fodder Corn. Preferred for fodder to the yellow kinds.

Egyptian Sweet. Medium season.

CORN-CRIB. Fig. 16 represents the plan of a corn-crib, well calculated for ventilation, convenience and durability. The posts are set in grout; on the top of these are old tin pans inverted or sheet iron (not shown in the cut), to render the crib mouse and rat proof; the passage-way is wide and high enough for a man to carry a bushel basket of corn on his shoulder; the slats in the passage-way are left open at the top to within three feet six inches of the floor, between the second and third beams from each end, the crib being 32 feet long. Temporary slats, with a small cleat three-quarters of an inch wide at each end, are let into the grooves formed by the ends of the permanent upper slats, and a cleat is nailed on the inside part, so that the crib can be filled full from end to end. The floor is of hemlock plank, two inches thick, and the longitudinal joints are left half an inch apart. The timber in the crib is as follows: Sills of hard maple, 6 feet 6 inches long, 4 by 4 inches; plates of same, 7 feet 6 inches long, 4 by 4 inches; outside posts of hemlock (flaring 6 inches), 4 by 4 inches; inside posts, hemlock, upright, 7 feet 2 inches high between shoulders, and 4 by 4; inside, 2 feet 4 inches apart for passage-way; slats, 16 feet long, 5 by 1 inch, and ¾ of an inch apart, put on horizontally; foundation posts of cedar, 6 inches in diameter, 3 feet in the ground, 2 feet 6 inches out. Grout holes, 3 feet deep and 2 feet square, filled within 4 inches of the top of the ground.

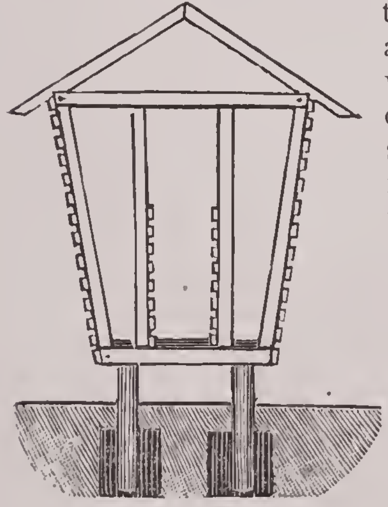


FIG. 16.—*Corn Crib.*

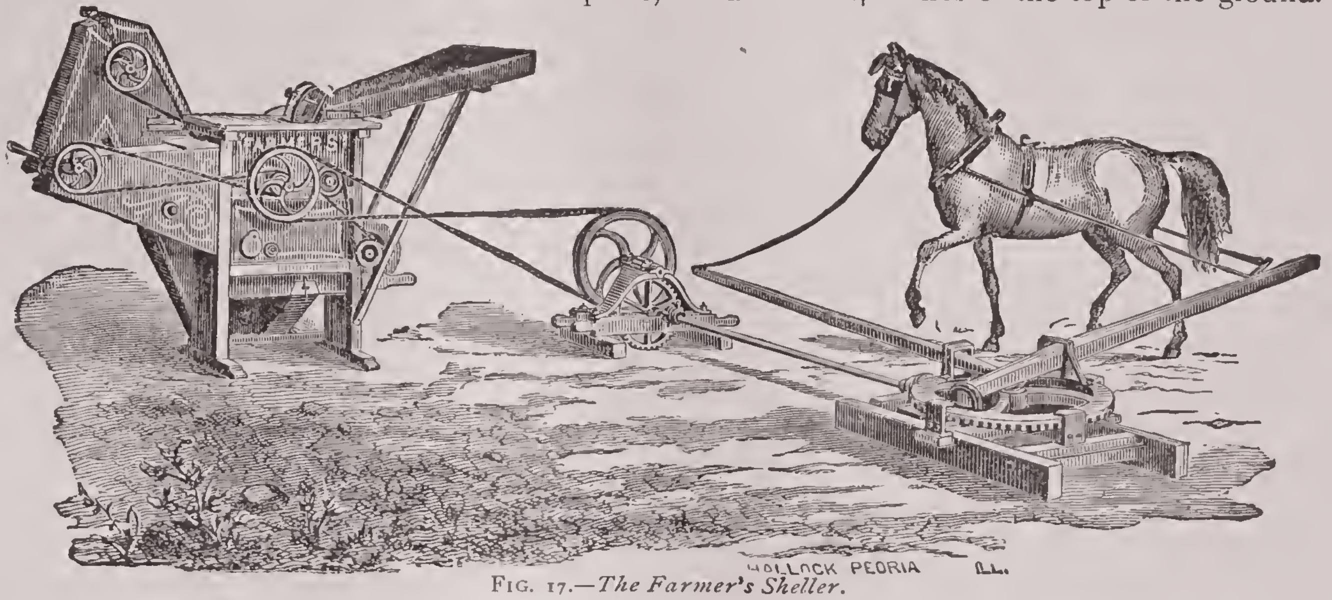

HOLLOCK PEORIA ILL.

FIG. 17.—*The Farmer's Sheller.*

The posts and bents are 5 feet 4 inches apart from center to center. Length of crib, 32 feet, or 48 feet if wished for. Projection of eaves of roof, 12 inches.

Corn-cribs are often made double, that is, two long cribs are built parallel to each other about nine feet apart and the intervening space roofed over. This forms a sheltered passage way into which the loaded wagon is driven, and may be left standing secure from rain or snow Cribs are also often made as a part of the barn, with great convenience; also with pig-pens attached, and with contrivances for letting out the corn for feeding, etc.

CORN-HUSKER. Machines for husking corn have been invented which operate very well, except that they leave the stalks in irregular heaps. As most farmers in the corn-growing sections of the Union husk their corn from the standing stalks in the field, they have little use for husking machines.

CORN-SHELLER. The corn-sheller best adapted to the farmer's use, depends on the quantity of corn he has to shell. There are many good shellers in the market, among which we give illustrations of several.

Fig. 1 represents the Derby sheller. This is a two-hole sheller and discharges the cobs at the end. The shafts are of wrought iron with Babbitted bits. It is an excellent small sheller.

Fig. 2. The Prince, a one-hole, feed-table, hand sheller, is well made, easily run and well adapted to the use of those having small quantities of corn to shell.

The Eagle Sheller, Fig. 4, has wrought shafts and Babbitted boxes. The frame is well made, bolted together and nicely finished. It shells clean, separates the cob from the corn and does not choke. It will shell any kind of corn, from pop-corn to ears three inches in diameter.

Fig 6, the "Veteran," has the revolving, wire cob-rack, for separating the cobs from the corn, and a fan for cleaning the corn.

The "Monitor," Fig. 11, is a hand sheller, simple in construction and quickly adapted to a box or bin, and shells seed-corn without injury to the kernel.

The double-cylinder sheller, Fig. 13, is a "power" sheller. It has a second small cylinder which revolves in the same direction as the large one, and between these cylinders the corn is shelled without breaking the cobs or grain. Should a stone or any hard substance get into the sheller the small cylinder will prevent any damage being done to the teeth or the machine. It will shell all corn from the cob, no matter how wet or tough it may be, and is geared to attach to any power, running at 75 revolutions of tumbling rods to one of the horses.

Fig. 17 represents a sheller worked by horse power. It requires no extra help. It can be used also as a hand sheller. It is compactly built, and when not in use, occupies but little storage room.

Fig. 12 represents a large power sheller and Fig. 5 shows how it works.

The ear-corn is fed into the feed-hopper A, thence it is carried by chain conveyors, the ears being straightened by beveled partitions arranged for that purpose, and are presented endwise to the machine. Entering the machine at the point B, they are rapidly and unerringly pressed between the shelling-wheels by the action of the "force feed." In passing between the shelling-wheels the corn is completely removed from the cob. The cobs, following the course of the fluted underplate, are deposited upon the revolving wire cob-rake and from the point C are discharged into the hopper of the cob-stacker D.

The shelled corn falls upon the screen of the shaking shoe F, and is at the same time exposed to the blast from the fan E, and is thoroughly purged of all dirt, silk, tips of cobs and other impurities, and is then discharged from the under plate of the shoe in a spout which conducts it to the bin.

Fig. 10 is a large power sheller for warehouse men. It is self-feeding and made in three different sizes. The two-hole has a capacity of 600 to 800 bushels per day; the four-hole from 1,500 to 2,000 bushels per day, and the six-hole from 2,500 to 3,000 bushels per day.

For farther information in reference to mills, see also Grist Mill and Hominy Mills.

Corn Planter. While a hand-planter is all that is required for small fields or rough ground, a regular two-horse planter does more and better work, where the ground will admit of its operation at all. There are many kinds in market, the patents on most of which have run out. We call attention to a few modern features. Fig 1 is a cut of a rotary drop planter on which a check-rower (Fig. 2) can be successfully used. It cannot be locked, and thus is prevented a great deal of trouble and loss.

Barnes' Wire Check-Rower, Fig. 3, is an arrangement for doing perfect work. The wire is of annealed steel, made especially for the purpose, and does not cross the machine. There is no stretching and drawing up of the wire, as in the use of rope. Unnecessary friction on the pulleys and heavy side draft are avoided. A check rower saves the trouble of previously marking off the ground, and will work on any land where any other style of horse planter can work.

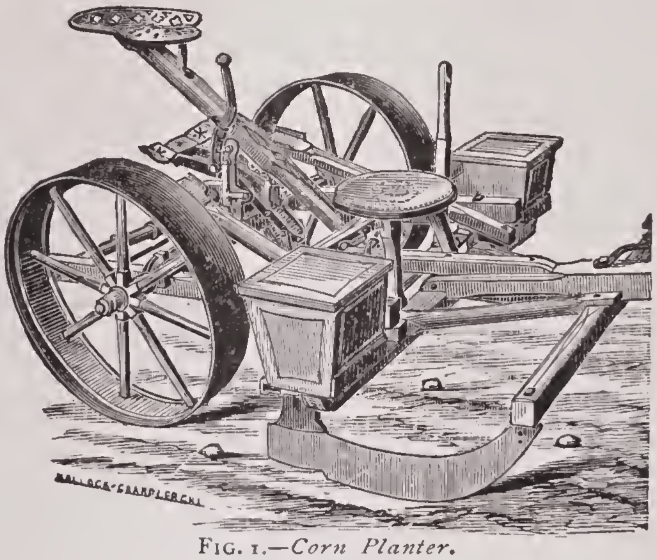


FIG. 1.—*Corn Planter.*

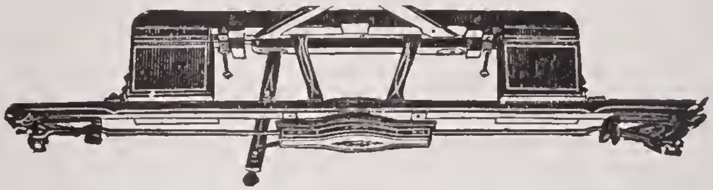


FIG. 2.—*Check-Rower.*

Corn, To Can: see page 157.

Corn, Green, To Cook. Husk the corn; pick off all the silk; cut off the rough ends; put it into boiling water and let it boil half an hour.

Another: Prepare and boil as above, cut the kernels from the cob, stir in a little butter and salt and send to table in a covered dish.

To Stew Corn. Choose well-filled but tender ears; cut it from the cob with two cuts to the grain; also make an incision lengthwise of the ear. It can then be cut off the cob without the skin. Then put the cobs on to boil in a stew-pan, covering them with water. When well cooked, having boiled say, 20 minutes, take them out and put the corn into the water in which they were boiled. When sufficiently done—only a few minutes are required—season with pepper, salt, cream and butter, adding a little sugar if preferred very sweet. This receipt may be relied on as being a peculiarly excellent one, the sweetness of the corn being unsurpassed when the directions are exactly observed.

To Prepare Canned Corn. Take the corn from the can; put into a saucepan with a little salt, a cup of cream or milk, and the same of water, or all milk if preferred. Let it come to a boil, and just before you take it off, add a piece of butter the size of an egg.

Corn, To Dry. Put the ears of sweet corn (none other so good) into a moderately hot oven, and let it dry sufficiently to shell easily, taking care not to scorch it. When shelled, let it stand in a warm oven until perfectly dry. This way of drying has the advantage of retaining all the sweetness of the corn, and also of being much less trouble than the usual ways. Of course, dried this way it will require longer cooking when used. Another method is to cut from the cob raw, heat thoroughly in the oven, then dry in the sun. The Shakers steam the corn for about five minutes, to "set the milk," then shave it off by running the ears over a bit like an inverted jack-plane, with a trough surface nearly fitting; and then kiln-dry it on perforated tin or zinc, where they constantly stir it. Finally they pack it in three-bushel barrels for shipment.

Corn, To Measure in the Crib. Two cubic or solid feet of good, sound, dry corn in the ear will make a bushel of shelled corn. To ascertain the number of bushels of shelled corn in a crib of corn in the ear, then, measure the length, breadth and height of the crib inside the bin. By height is meant, of course, the height of the corn in the bin. Multiply the length by the breadth in feet, and the product by the height, and divide by two. Corn in the crib shrinks and settles during the winter, so there will be some difference between measurements taken in fall, and spring or summer.

Example. Required the number of bushels of shelled corn in a crib 20 feet long, 10 feet wide and 6 feet high: 20 x 10 x 6, divided by 2, equals 600 bushels, the answer.

When the Crib is Flared at the Sides. Multiply the sum of the top and bottom widths in inches by the perpendicular height in inches, and the product by the length in inches and divide the amount by 2,748, and the quotient will be the number of heaped bushels of ears. Take two-thirds of the quotient for the number of bushels of shelled corn.

Example. Required the number of bushels of shelled corn contained in a crib of ears 4 feet wide at the bottom, 8 feet at the top, 10 feet in perpendicular height, and 15 feet long?

Solution. 48 inches, bottom width, plus 96 inches, top width, equal 144; divided by 2 equal 72, x 120 inches, perpendicular height, x 180 inches, length, equal 1,555,200; divided by 2748, equal 565.9 bushels ears, ⅔ of which is 377.28 bushels shelled corn, the answer.

The above rule assumes that three heaping half-bushels of ears make one struck bushel of shelled corn. This proportion has been adopted upon the authority of the major part of our best agricultural journals. Nevertheless, some journals claim that two heaping bushels of ears to one of shelled corn is a more correct proportion, and it is the custom in many parts of the country to buy and sell at that rate. Of course much will depend on the kind of corn, the shape of the ear, the size of the cob, etc. Every farmer must judge for himself, from the sample on hand, whether to allow one and one-half or two bushels of ears to one of shelled corn. In either case it is only an approximate measurement, but sufficient for all ordinary purposes of estimation. The only true way of measuring all such products is by weight.

A barrel of corn is five bushels shelled. By this latter measure corn is estimated, and corn bought and sold throughout most of the Western and Southern States. At New Orleans a barrel of corn is a flour-barrel full of ears. In some parts of the West it is common to count 100 ears to the bushel.

Corn, Value as Food for Stock. According to the Patent Office reports, and the results of numerous experiments, 1 bushel of corn weighing 56 pounds will produce 10½ pounds of pork. Throwing off 1-5 to come at the net weight gives 8 2-5 pounds of pork as the product of 1 bushel of corn; or, 1 pound of pork as the product of 6⅔ pounds of corn; 3¾ pounds of cooked corn meal makes one pound of pork. Assuming that it requires 6⅔ pounds of corn to make 1 pound of pork (exclusive of the labor of feeding and taking care of hogs) the relation which the price of corn bears to that of pork is exhibited in the following:

Corn per bush.	Pork per 100 lbs.	Corn per bush.	Pork per 100 lbs.
$ .12½	$1 50	$ .38	$4 52
.15	1 78	.40	4 76
.17	2 00	.42	5 00
.20	2 38	.45	5 35
.22	2 62	.50	5 95
.25	2 96	.55	6 54
.30	3 57	.60	7 14
.33	3 92	.65	7 74
.35	4 00	.70	8 57

By reversing the above table we have the price of corn per bushel at different prices per pound for pork. The use of the above table is obvious. For example, should corn be selling for 50 cents per bushel and pork only 5 cents per pound, it would be more profitable to sell the corn; but should corn be selling for 40 cents per bushel and pork for 6 cents per pound, it would be most profitable to reduce the corn to pork, and sell the latter.

To Find the Price of Pork per Pound, Taking the Price of Corn per Bushel as the Datum: Divide the price of a bushel of corn by 8.4 (the number of pounds of pork produced by a bushel of corn) and the quotient will be the answer.

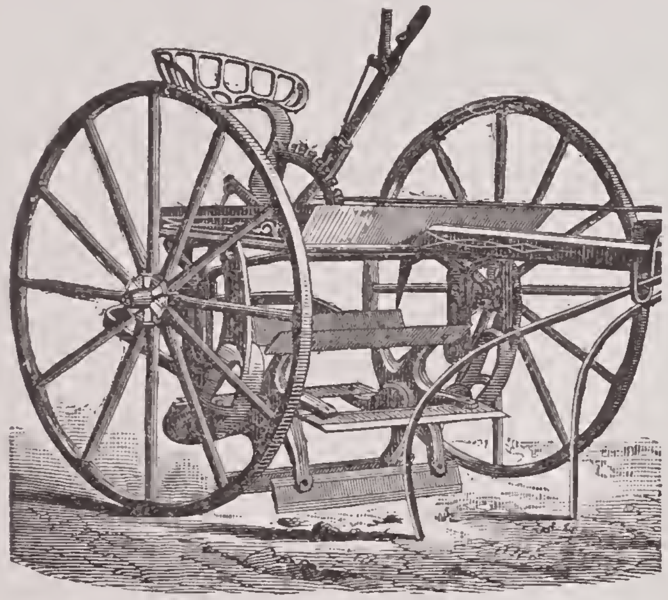
Example. When corn is 20 cents per bushel, what should be the price of pork per pound?

Solution. 20 cents divided by 8.4 pounds equals 2.38 cents, answer. To find the price of corn per bushel taking the price of pound as the datum, multiply the price of a pound of pork by 8.4 (the number of pounds of pork produced by a bushel of corn) and the product will be the answer.

Example. What would be the price of corn per bushel when pork is selling at 4½ cents per pound?

Solution. 4.5 cents multiplied by 8.4 equals 37.8 cents, answer. The foregoing table and rules must not be taken as invariably correct. The proportions and results will be influenced by many conditions and causes, such as the sample of corn used, the constitution and breed, as well as the age of the animal, its condition, powers of digestion, habits, health, etc. The very nature of the subject precludes the possibility of exactly defining the results and proportions. At best we can only have some general average results and rules. The foregoing are deemed safe general averages.

Corn Salad, Lamb's Lettuce, Fetticus. This is a soft, mild salad plant, of no great account except that it can be used for greens in early spring before anything else is ready. Plant early in September in shallow drills; cover lightly with straw or leaves for protection through the winter; treated precisely as spinach, except that thinning the plant is not essential.



Corn-Stalk Cutter.

Corn-Stalk Cutter. One of the most useful and labor-saving machines upon the farm is a good corn-stalk cutter, to enable the agriculturist to save the stalks as manure to the ground and plow them under as readily as so many corn-cobs. See also Feed Mills.

Cornet, or **Coronet,** of a horse, is the lowest part of his pastern, that runs round the coffin, and is distinguished by the hair that joins and covers the upper part of the hoof.

Corns. Those who have been unfortunate and unwise enough to wear boots and shoes that were too tight have a painful appreciation of the sort of a thing a corn is. The remedies and "corn cures" that have been on the market and recommended by friends are as numberless as the sands of the sea-shore, almost. The best cure is a preventive in the way of large, heavy-soled boots and shoes. For treatment of corns we recommend the following:

Roll a lemon until it is soft; cut a thick slice and bind it on the corn on retiring at night. Several applications may be necessary. When the corn becomes white and disintegrate, pull it out with the finger nails, never using a knife. Raw cotton saturated with turpentine may be used the same way.

Another: Place the feet for half an hour, two or three nights successively, into a pretty strong solution of common soda. The alkali dissolves the indurated cuticle and the corn comes away, leaving a little cavity, which, however, soon fills up.

Another: Soak ivy-leaves in vinegar during the space of 15 days; then place a leaf or part of a leaf over the corn; renew it every morning and scrape off with pumice stone, dipped in vinegar, each time the hard portion of skin is detached. The vinegar acts by stimulating the absorbents; and the friction hastens their action. The pumice stone and vinegar will answer the purpose, if used every morning.

Corral, a Spanish word in common use in the West, signifying a yard or enclosure, especially for cattle, near a house. Used also as a verb.

Corridor (cor′ri-dor), a gallery or passage-way leading to apartments independent of each other.

Corrosive Sublimate is a subtle mercurial poison. When swallowed in improper quantities, the patient should swallow the whites of several eggs; albumen gives a white precipitate with salts of mercury, which is insoluble in the juices of the stomach. Or, take milk and cream; or a decoction of cinchona; or an infusion of galls. This dangerous poison should never be given to any animal as medicine. It is, however, used in solution in some skin diseases of animals, such as ring-worm and mange. When so used only a small portion of the body should be washed with it in one day. For this purpose take 4 grains of the sublimate to 2 ounces of rain-water. For a dog 2 grains to the ounce, in water, will be strong enough. In solution it is efficient to kill bed-bugs. It will be a long time before any return where this wash has been put.

Corrugated, wrinkled or folded, like the zinc of a wash-board.

Cosmetics, external applications to beautify the complexion. See Face.

Costiveness, same as Constipation, which see.

Cotswold, a breed of sheep: see Sheep.

Cottage, a cot or hut. This term was formerly limited to a poor or shabby habitation, but is now applied also to any small, neat and tasteful dwelling. See Residence.

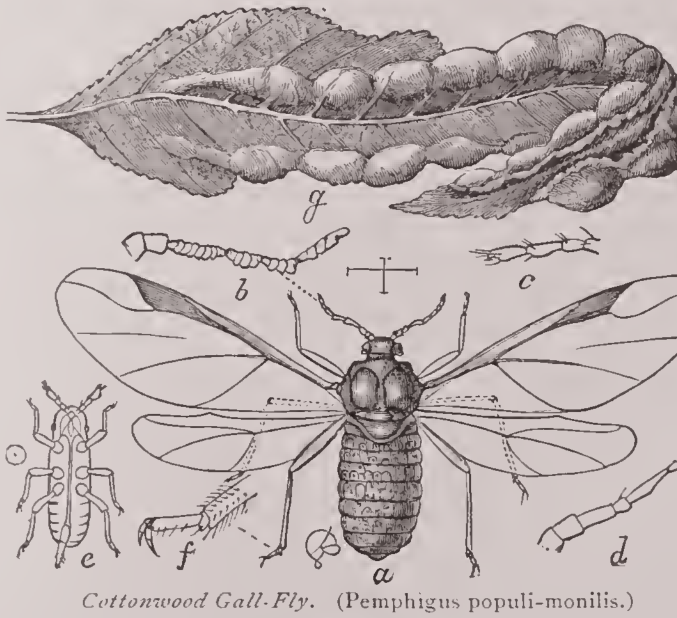
Cotton. The cotton plant does well as far north as the Ohio river valley, but the cultivation of it is far more remunerative in the Gulf States. The most common kind is the "upland," so called in contradistinction to "Sea Island" cotton, the latter having longer fiber and of superior quality. American cotton of both kinds commands a higher price in England and the continent of Europe than that which comes from the East Indies; and as it is found by repeated trials that American seed, introduced into India, even under the management of American planters, deteriorates so much as to fail even to compete with the native variety, the citizens of this country can feel safe with reference to the production of this most important commodity. The area of cotton planting has, since the civil war, greatly increased. With improved methods of cultivation and careful rotation, there is no reason why this crop should exhaust the soil. The greatest draw-back to the profitable cultivation of the plant exists in a few injurious insects, the "boll worm" being one of the most prominent. All sorts of manure and fertilizers are applicable, and many of them abundant, as marl, gypsum, lime, rotten limestone, fish remains, sea-weed, oyster-shell lime, besides all the waste products and manures about the house and stable yards.

Of late years cotton-seed oil has become a merchantable article, and large quantities of it are beginning to be manufactured throughout the South.

CULTIVATION, ETC. Clay loam and silicious soil and a clay sub-soil are best for upland cotton. Sandy soils over sandstone or limestone and rich bottom lands are productive. Other soils, properly treated, may be made available. The presence of mineral elements is indispensable. The Sea Island cotton grows only on low, wet land. Deep plowing is essential, as the plant has a long tap-root. Under draining is important—often absolutely necessary. Plowing is done in January, February or March, after which the land is allowed to settle until about three weeks before planting. Bedding up is the next step. A "scooter," or narrow-bladed plow, is run through the field where the rows are to be planted, from three to seven feet apart, according to the fertility of the soil. In this furrow the fertilizer used is placed. With a turning-plow, one furrow on each side, a ridge is made covering the fertilizer, and forming a bed for the plant. Run the "scooter" along the center of the ridge, drop the seed after they shall have been rolled in wet ashes. The covering is done with a board the width of the furrow, with scoop or groove cut in the center of it, and screwed to the scooter. The seeds should be in hills from 8 to 20 inches apart, six to eight seeds to the hill. When about two inches high, the plants are thinned to two or three stalks in a hill. Ten days afterward the crop is hoed, or has a little dirt thrown around the plants with a plow. Two weeks later it is again hoed and plowed, all grass and weeds being removed. In two or three weeks more, it is again hoed and plowed, after which there is nothing more to do. The planting is done immediately after the last frost in the spring. Two to five bushels of seed will plant an acre. Picking is generally done by hand, as soon as the pod is well open, in July or August. There is a machine for picking, but the old hand method is considered the best. After picking it is spread out to dry on scaffolds. When a seed pressed between the teeth will crack with some noise it is sufficiently dry. It has to be turned and stirred frequently. It is then ginned and baled.

Cotton-Seed Meal. How to use cotton-seed meal in feeding it to stock is a matter of no little importance. When fed too freely it may do much harm, and therefore should be used intelligently. It is worth now about $30 per ton, and is considered at that price one of the most useful foods when used with judgment. Analyses show that a ton of cotton-seed meal contains 38 pounds of potash and 56 pounds of phosphoric acid with 78 pounds of nitrogen. Being so rich in nitrogen and oil it should be used with food rich in starch, such as potatoes and roots. One pound of cotton-seed meal is considered by some equal to two pounds of corn meal. Thus it will be seen it is so rich that it must be fed only in small quantities. A Southern writer says two pounds a day are quite enough for a cow that is milking; a calf should not have more than two to four ounces; pigs will not thrive on it at all, as it is too rich for them, except when given in small quantities mixed with bran slops, or cut roots. Horses do well on it, if given two pounds daily with corn meal; two pounds of it equal ten pounds of oats. But, if fed too abundantly, the bowels are made very costive and the kidneys are affected. This is doubtless on account of its highly nitrogenous nature, as the waste nitrogen is eliminated from the system through the kidneys, and they are too actively excited by very rich food. The next ill effect is an inflammatory condition of the system, and in cows there is a danger of garget, and horses suffer from irritation of the skin, sore mouth, and hide-bound. It is as though a man were fed on extract of beef, rich pastry, and such food only. One pound of cotton-seed meal mixed with half a peck of boiled potatoes mashed together would make good feed for a fattening pig, or a milking cow, but the pig should have corn or bran for the second daily feed. These facts should be kept in mind, as there is little doubt that more of this food will henceforth be used in this country than has been heretofore.

Cottonwood, a familiar tree, of the class of poplars, growing in wet lands, to an enormous size. Being a very rapid grower, it has been introduced to some extent upon the high, flat prairies of the West, but as the wood is not valuable and the tree not ornamental as a shade tree, its further propagation was many years ago abandoned. At the present day botanists are inclined to believe that there is but one species. The engraving illustrates the figure and work of an



Cottonwood Gall-Fly. (Pemphigus populi-monilis.)

a, fly (natural size indicated just above); b, c, d, f, antennæ (different stages, magnified); e, female.

insect which flourishes in central Colorado and southern Kansas, operating only upon cottonwood. Several species of the same genus are common pests in the garden and orchard. See Insects.

Coughs are brought on in many different ways, which it is not necessary to mention here. We give some of the more efficient remedies.

Dry Cough. Take lemonade, made into a syrup by the addition of a considerable quantity of white sugar, and sip from a spoon and slowly swallow it. The acid of the lemon thins the secretion from the mucous membrane, and the sugar has a sheathing and soothing action, allaying irritation and promoting expectoration, which are the two great ends to be accomplished in all inflammations of the throat, nose and bronchial tubes. The use of opiates may allay irritation and smother up the cough, but they check the secretion, which is the natural mode of relief; and thus, instead of curing, they often aggravate the inflammation to such an extent that fatal disease is the consequence.

Cough from Cold. Take ¼ pound of coltsfoot; ¼ pound of hoarhound; ½ pound white sugar; make into a syrup by boiling with 1 pint of water. Take occasionally during the day in doses of a tablespoonful. Or, ½ pound elecampane root; ½ pound spikenard root; ½ pound comfrey root; ½ pound blood root; ½ pound hoarhound leaves; put all together in 1 gallon of water and boil down to 2 quarts; then strain and add 1½ pounds white loaf sugar, and boil again until reduced to 1½ pints; for adults, 1 tablespoonful 3 times a day, doubled at night; children, 1 teaspoonful. Or, make a very strong tea or syrup of the following roots and herbs: equal parts of the spikenard, elecampane, comfrey, bloodroot and hoarhound herb; sweeten with honey or granulated sugar. Dose, a tablespoonful 3 times a day.

Tickling Cough. Take 6 tablespoons of molasses, and juice of ½ a lemon; simmer over the fire till well incorporated; take off and add 1 tablespoon of paregoric, and about the size of a horse-bean of refined nitre. Take 2 teaspoons when the cough troubles.

Consumptive Cough. Take sanctuary, hoarhound, bayberry bark, 2 pennyworth of each; and of agrimony, raspberry leaves, cleavers and ground ivy, 1 pennyworth; extract of licorice, 4 ounces; and ½ a teaspoon of cayenne pepper; gently simmer in 2 gallons of water for an hour.

Another: Take 1 pint of milk, warm it, and when it comes to the boiling point, add as much mustard as will turn it to a posset; take away the curd, and into ½ pint of the posset put 1 ounce of brown sugar candy, to dissolve. Take the posset as hot as you can at night, when in bed, and renew it for 3 or 4 times. This has given relief in asthma.

Hacking Cough. Wring a towel from cool water, and put around the neck on going to bed, putting a dry one over the first. Continue this treatment for some time, and you will be relieved.

Chronic Cough. Take equal parts chlorate of potash and burnt alum; pulverize and mix. Take ¼ teaspoonful of the mixture stirred into a teaspoon of molasses or honey from 3 to 5 times each day.

Asthmatic Cough. Take 2 good handfuls of colt's-foot leaves, 1 ounce of garlic, and 2 quarts of water; boil down to 3 pints, strain, and to the liquor add 8 ounces of sugar; boil gently for 10 minutes. Take half a cup occasionally. See Asthma.

Coulter: see Colter.

Counter, in farriery, the breast, or that part of a horse between the shoulders and under the neck.

Counterfeit Money, to detect: see Money.

Coupling-Pole, of a wagon, sometimes called "reach," is the piece joining the two axletrees.

Coupon (coo′ pọn), a small slip of paper attached to a bond or other security, and containing an order for the payment of a stated portion of the interest or dividend accruing on the bond as it matures. It is detached when redeemed. Secondarily, the term "coupon" is often used to denote any kind of certificate, note or order attached temporarily to a ticket or other obligation.

Court Plaster, a kind of varnished silk, used to cover recent cuts, to keep the edges in contact and defend them from the action of the air. Its manufacture is simple and easy. Bruise a sufficient quantity of isinglass and let it soak in a little warm water for 24 hours, expose it to heat over the fire till the greater part of the water is dissipated, then supply its place with proof spirits of wine, which will combine with the isinglass. Strain the whole through a piece of open linen, taking care that the consistence of the mixture shall be such that when cool it will form a trembling jelly. Extend a piece of black or flesh-colored silk on a frame, and fix it in that position, then apply the isinglass (after it has been rendered liquid by a gentle heat) to the silk with a brush of fine hair. As soon as the first coating is dry, apply a second. If a very superior article is desired, supply a third coat. When the whole is dry, cover with two or three coatings of balsam of Peru. As every farmer and his family ought to have a good supply of this very convenient necessity, the above process will afford it cheaper and less injurious than that which is kept at the drug stores. Every laborer ought to carry a slip of it with him in his pocket. See Collodion.

Cover or **Covert,** in hunting, denotes the woods, underbrush, etc., which shelter and conceal game; as, to "beat a cover," to "ride to cover." The feathers covering the bases of the quills of the wing or tail of birds are also technically called the "covert."

Cow, the female of the ox genus. Perhaps no domestic animal is so highly prized as the cow. She furnishes food, not only for her own offspring, but for other animals, in its most easily taken and assimilable form; and the cow has become the sign and expression of all comfort and good living. She is the most profitable property kept upon the farm.

Most of our domestic brutes have been so long and so entirely subject to the control of man that their original type is unknown; but it may be inferred from the fact that the cattle on the boundless pampas of South America, Mexico and elsewhere, which have been allowed entire freedom from all human direction or restraint for hundreds of years, do not differ materially from the domestic herds—that our present races do not differ in any essential features and characteristics from the original stock. The milking qualities of our domestic cows are, to some extent, artificial, the result of care and breeding. In the natural or wild state, the cow yields only enough to nourish her offspring for a few weeks, and then goes dry for several months, or during the greater part of the year.

There is, therefore, a constant tendency to revert to that condition, which is prevented only by judicious treatment, designed to develop and increase the milking qualities so valuble to the human race. If this judicious treatment is continued through several generations of the same family or race of animals, the qualities which it is calculated to develop become more or less fixed and capable of transmission. Instead of being exceptional, or peculiar to an individual, they become the permanent characteristics of a breed. Hence the origin of a great variety of breeds or races, the characteristics of each being due to local circumstances, such as climate, soil, and the special object of the breeder, which may be the production of milk, butter and cheese, or the raising of beef or working cattle.

All of the various breeds of cows are noticed in the article Cattle; the laws and practices which regulate the improvement or deterioration of any of her varieties are dealt with in the article on Breeding, and under this head in the Cattle article; the criteria of her age are treated under head of Age of Cattle in the article on Cattle; the diseases to which she is subject are fully treated under head of Diseases in Cattle article; the proper treatment of her offspring is noticed under the article Calves, and the proper management of her products are very fully dealt with in the articles Dairy, Milk, Butter, and Cheese. We, therefore, have only to treat in this article of the selection of cows for dairy use; the points of good milkers; training the calf; management, parturition, spaying, etc.

SIGNS OF A GOOD COW. None but good cows should be found upon the farm for steady keeping: the inferior ones should be selected out for beef. A good constitution in a cow is indicated by large lungs, which are denoted by a deep, broad, and prominent chest, broad and well-spread ribs, a respiration somewhat slow and regular, a good appetite, and, if in milk, a a strong inclination to drink, which a large secretion of milk almost invariably stimulates. In such a cow the digestive organs are invariably active, and they make an abundance of good blood, which stimulates the activity of the nervous system and furnishes the milky glands with an abundance of milky secretion. Such a cow, when dry, takes on fat readily. In order to have no superfluous flesh, the cow should have a small, clean, and rather long head, tapering toward the muzzle. A cow with a large, coarse head will seldom fatten readily or give a large quantity of milk. A coarse head increases the proportion of weight of the least valuable parts, which is a sure indication that the whole bony structure is too heavy. The mouth should be large and broad, the eye bright and sparkling, but of a peculiar placidness of expression, with no indication of wildness, but a mild and feminine look. These points will indicate gentleness of disposition. Such cows seem to enjoy being milked, are fond of caresses, and often return caresses. The horns should be small, short, tapering, yellowish, and glistening. The neck should be small, thin, and tapering toward the head, but thickening when it approaches the shoulder; the dewlaps small. The fore-quarters should be rather small when compared with the hind-quarters. The form of the barrel should be large, and each rib project further than the preceding one, up to the loins. She should be well formed across the hips and in the rump. The spine, or back-bone, should be straight and long, rather loosely hung, or open along the middle part. The skin over the rump should be loose and flexible. This point is of great importance; and as, when the cow is in low condition or very poor, it will appear somewhat harder and closer than it otherwise would, some practice and close observation are required to judge well of this mark. The udder is of special importance. It should be large in proportion to the size of the animal, and the skin thin, with soft, loose folds, extending well back, capable of great distension when filled, but shrinking to a small compass when entirely empty. The milk veins along the belly should be large and prominent, and extend forward to the navel, losing themselves, apparently, in the best milkers, in a cavity deep enough to thrust in the end of a finger. The teats should be widely set, of moderate size, and not too fleshy, the apertures permitting the milk to escape by an easy pressure of the hand. In the following paragraphs we give in detail the precise points of a good "milker," under the head of—

MILK-MIRROR, a peculiar quality and arrangement of the hair around and on the cow's udder and adjacent parts, affording a generally true index of her qualities as a milker. The marks called the milk-mirror, or escutcheon, consist of certain perceptible spots on and around the udder, on which the hair, instead of growing downward, grows upward. It seems well established that cows with the most perfect milk-mirrors, or escutcheons, are, with few exceptions, the best milkers of their breed. The milk-mirror is recognized by the upward-growing direction of the hair which forms it. As a matter of course, it is partly hidden by the thighs, the udder, and the folds of the skin, but is always recognizable if the hand be drawn downward. The direction of the hair of the milk-mirror being opposite to that surrounding it, may frequently be distinguished by the different shades of light reflected by it. The eye, however, must not be exclusively relied upon. According to their position milk-mirrors may be divided into upper and lower tufts, or escutcheons and milk-mirrors, properly so called. The former are comparatively very small, and are situated very near the vulva. They are common on poor milking races, but rarely occur on the best milch cow. They consist of one or two bands of up-growing hair and indicate the duration or length of the milk-flow. The larger the tufts the shorter the period of the milk-flow. That portion of the mirror which occupies the space immediately around the udder may be found in all cows, the quantity of their yield being determined by its size. In other cases, the udder, the perineum (the space between the udder and the vulva), the thighs and the inner surface of the legs are covered with this up-growing hair or milk-mirror. There will, naturally, be many irregularities of form in the escutcheon, but the principle stated above with regard to its extent and perfection will be found sufficient to cover nearly all cases, and, in connection with other characteristic signs and configurations, which we have given for judging accurately what should constitute a good dairy cow, few mistakes need be made.

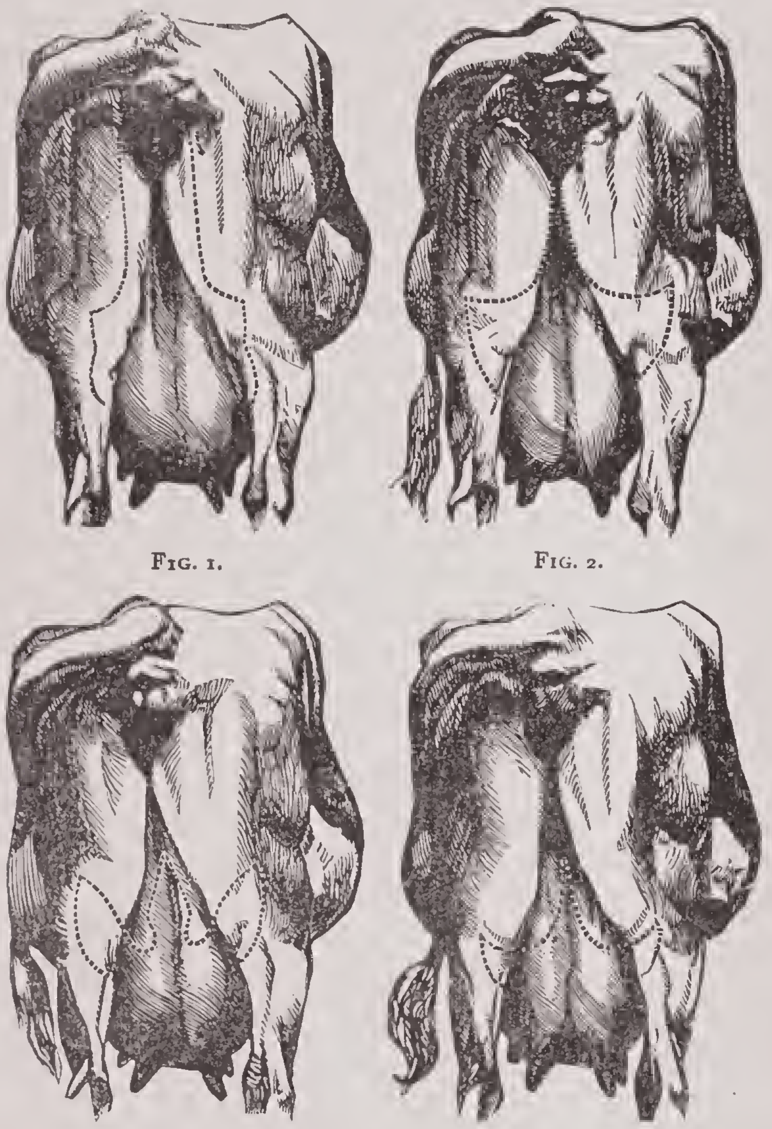


Fig. 1. **Fig. 2.** **Fig. 3.** **Fig 4.**

Milk Mirrors of Jersey Cows.

That it is correct as a rule, is sufficient to cause it to be given careful study and attention. We do not hesitate to say that he who will study carefully the illustrations we give, and the statements made, while he will find many varying signs, will not only be convinced of the accuracy of the system, but will be able, either in the cow or calf, to select with judgment. The milk sign also follows in the bulls. There is no point in judging a cow so little understood as the escutcheon. The conclusion of almost every one is, that her escutcheon is good if her band of up-running hair from the udder extends to the vulva and around it. These cows with the broad vertical escutcheons are nearly always parallel cows, that is, with bodies long but not large and with the under line parallel with the back. Their thighs are thin, and the thigh escutcheon shows on the inside of the thigh rather than on the rear.

Next comes the wedged-shaped cow, with the body shorter but very large, deep in the flank, and very capacious. This form does not usually exhibit the vertical escutcheon running up to the vulva, but with a broader thigh may exhibit a thigh escutcheon which is preferable to the other: seeFig. 2. In both vertical and thigh mirrors, where the hair runs down, intruding on the udder, as low as above the dotted lines, as, in Figs. 3 and 4, it damages the escutcheon. If you find a cow with the hair all running down, and between the thighs, that is, with no up-running hair, stamp her as a cipher for yielding milk. There are times when the udder of a cow with an escutcheon like Fig. 4 will be enlarged by non-milking, for the purpose of deception. It is always safer to judge by the escutcheon rather than by the large size of the udder. The escutcheon of the best cows, those yielding the most and continuing the longest, will be found to be those which conform to Fig. 2. The vertical escutcheon of Fig. 1 would not injure it; but if that ornamental feature has to be at the expense of the thigh escutcheon, Fig 2 is the best as it is.

Many think that the escutcheon of the bull is of little moment, so that he has a good look. So far is this from being the case, that a bull with a mirror like Fig. 4, or worse, will stamp his escutcheon on, and to that extent damage, his daughters out of cows with escutcheons as choice as Fig. 2. In this way the daughters of some of the best cows come very ordinary, while, if you use a bull marked like Fig. 2, he will make a poor escutcheon better, and will improve the best. His injury or benefit will be double according to the escutcheon markings under the body in front of his scrotum. Hence the importance of the dam of a bull being unexceptionable in her udder and escutcheon. Her qualities inherited by her son will be transmitted to his daughters.

While careful as to escutcheons, we must not neglect the other essential features of a good cow—the back, skin, hide, rich colored skin, and the fine bone. Let the hair be soft and thickly set, and let the skin be mellow. This latter quality is easily determined by grasping between the thumb and forefinger the skin at the rear of the ribs, or the double thickness at the base of the flank that joins the stifle-joint to the body, or that on the inside of the rump-bone at the setting on of the tail. Let the teats be well apart; let them yield a full and free stream and be large enough without the necessity, in milking, of pulling them between the thumb and fore-fingers. And let it ever be kept in mind that the large yielder must be well fed.

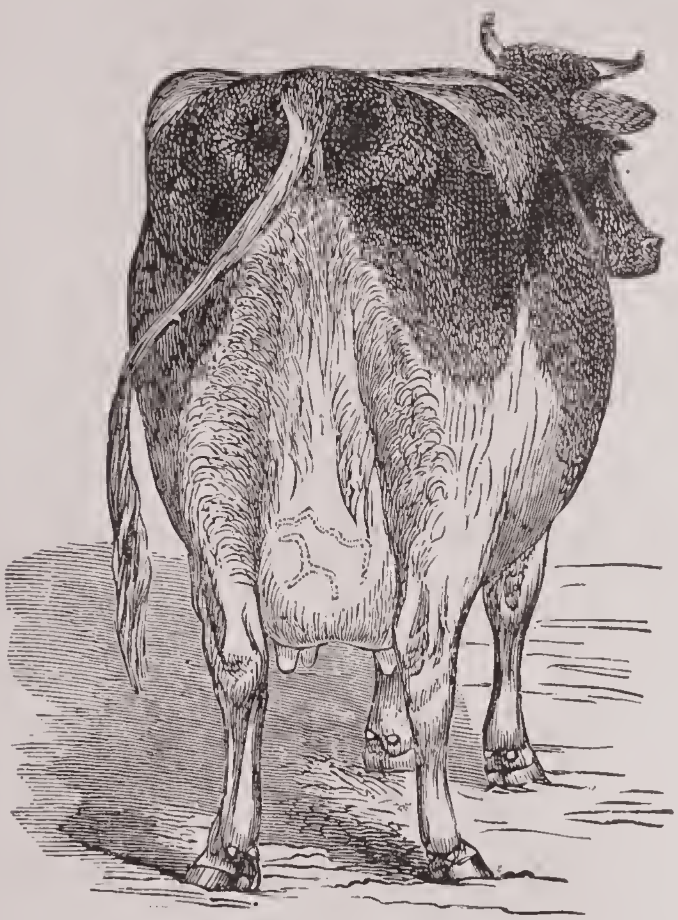


Fig. 5.—*Great Milk Mirrors on Holstein Cows.*

Training the Calf. This is a very important feature in producing good milkers. If the calf has been raised by hand, that is, fed with milk from the pail, it will, or should have, become so gentle and familiar as to allow itself to be approached readily, and to respond to the call of its master. Many persons at this time name every calf, and thus they soon come to know their names when called. If firmness and at the same time gentleness have been used, so that the calf will understand that there is nothing to fear; if no struggle is made, it is well on the way to understand what is further expected of it. It should be rubbed and curried occasionally, especially on those parts of the body that itself cannot reach, as the head, neck and shoulders; or, if kept in the stable constantly, it should be brushed all over at least once a day. Here is one of the first and most important lessons. At first, the calf does not know what is intended. If the master gets angry and beats it, it will ever after associate currying and brushing with a beating; and when it gets older and stronger, in the constant successions of struggles to escape punishment, it will at length find it is the stronger animal of the two. Thereafter itself and not the man is master. The object of currying is not to give pain. It is an operation of cleaning that the animal cannot perform for itself, because confined in a stable. If the animal is turned out during the day, and confined only at night, or if it have the range of the yard and sheds day and night, the cleaning is not needed. Animals can and do perform these offices for themselves and for each other by licking, so far as necessary. The accumulating scurf in an outdoor life is a provision of nature for the protection of the animal. It should not be touched. In the stable, however, it is different. The lack of exercise tends to a sluggish movement of the blood, and hence a clean skin becomes one of the most active integers in preserving the health of the animal. In using the comb or brush, or, in the case of cattle, the card and brush, a light hand with the comb and card will do better work than a heavy hand. It should be unnecessary to say that about the bony parts the card or curry-comb should never be used.

Haltering. The first thing a calf should be taught is to stand quietly when tied and under all circumstances. If it is taught this by being tied up immediately upon being taken from the cow to be fed milk, or at from three days to a week old, there will be no difficulty.

Training to Milk. In training to stand quietly while being milked, the udder should be often handled while the heifer is growing up; the bag should be rubbed; it should be pressed and the teats gently pulled. This need take but very little time. The real work comes when the animal is to be milked. There are many things to be taken into consideration here. The heifer must be put in a pen where she cannot hurt herself, and where the milker can operate easily; a pen just large enough for the heifer to stand in, five feet high and tight enough so there will be no danger of the heifer injuring herself, and with an opening for the milker to operate through, will thoroughly subdue the wildest. Generally, all that is needed will be to tie the heifer by the head, and then patiently show her that she will not be hurt. She will soon come to associate the act of milking as easing the udder and thenceforward will stand quietly, unless the bag or teats hurt her. If so, seek the cause of the difficulty and cure it.

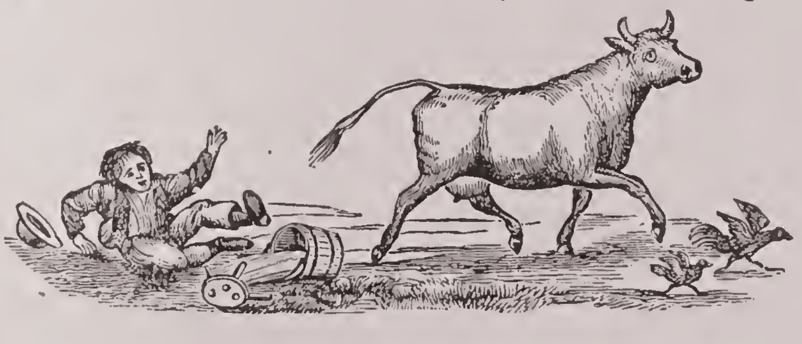


Fig. 6.—*Bad Management.*

If the animal has never been tied up, but has been handled in the yard, one person may take the heifer by the horns, while another milks. If she be very refractory she may have to be "nosed." Seize the off horn firmly with the right hand, and thrust the two first fingers and thumb of the left hand into the nostrils, clasping the membrane tightly if she struggles severely. So soon as the struggles cease, ease the pressure of the fingers in the nostrils. If she again struggles, again tighten the grasp. Let the milker use gentleness. It does no good to kick an animal; it may do much harm. If the heifer kick, it is probably because she is hurt. A person of ordinary strength need not be kicked while milking, unless in the case of a cow of extraordinary strength and viciousness. The wrist of the left hand holding the teat, if kept well against the stifle, and pressed firmly back when the foot is raised, will generally cause it to be set down in place again. Use soothing words when the animal is quiet, and low but firm words of command when refractory. If the udder is inflamed, as is very often the case soon after calving, bathe it carefully with cold water, so as not to shock the animal. She will soon come to associate a feeling of relief with the operation and like it. In fact, the whole art of training may be summed up in the sentence: Use discretion and judgment, and show yourself superior to the brute—in truth, its friendly master. The conquering of brute force by brute force is a relic of barbarism. There are vicious animals as there are vicious men; there are dangerous animals as there are dangerous men. Both may have been bred or educated thus. Vicious men are placed where they cannot injure their fellows; vicious animals had better go to the butcher—they are as unprofitable to breed from as they are useless for what may be got out of them.

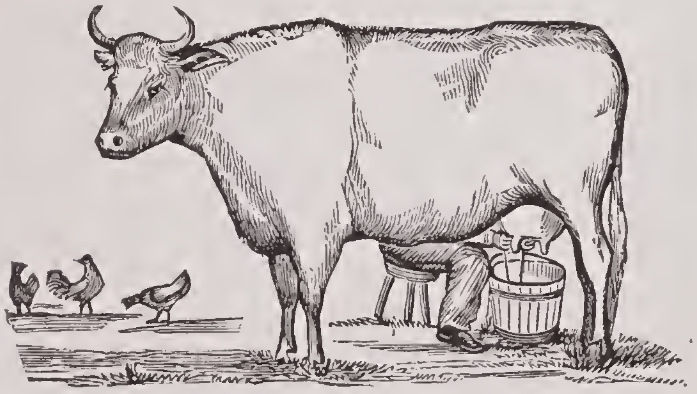


Fig. 7.—*Result of Good Handling.*

As showing the effects of bad and good handling, we give the picture of a cow made wild and vicious by bad handling (Fig. 6), and that of a cow used to kind treatment and gentle but firm handling (Fig. 7). The reader can draw his own conclusions as to which is the better system.

Feeding. Milch cows ought always to be maintained in good condition. When they are ill-fed in winter, they not only cease to give a due proportion, or even any proportion whatever, of milk, but they become so thin in their ordinary juices and so reduced in their whole substance that when restored in spring to a fair degree of feeding, they spend, in filling up the waste of their system, a large proportion of the time and the food which would otherwise be employed in the secretion of milk. Also, when they decline into poor condition during the months, or even weeks preceding calving, they afterward experience so severe and prolonged struggle between the process of secretion for making up their own substance and the process of secretion for supplying milk, that they will yield a decidedly scanty supply of milk throughout the better portion of the following season. They ought during the whole winter to be well fed, comfortably housed, abundantly littered, regularly supplied with clean water, occasionally combed, and in general treated with considerate and kindly regard to their sympathies, susceptibilities and wants. It is poor economy to attempt to keep too many cows for the amount of food the owner can furnish. One good cow, well bred and well fed, is worth two, and often three, ordinary scrubs, poorly fed and treated. The ordinary rules for feeding stock, elsewhere laid down under the head of "feeding," in Cattle article, apply to cows; yet there are special rules applicable only to milk-producing cattle. Feed regularly, and do not let cows become hungry and restless by waiting. If one goes into any well-regulated dairy establishment an hour before feeding, scarcely an animal will rise to its feet, but at the hour of feeding the whole herd will be likely to rise and seize their food with an avidity and relish not to be mistaken.

It is impossible to prescribe the exact food that should be given to cows throughout the country; in fact, no arbitrary rule is necessary. Locality and adaptability to products must determine this to a large degree. It has been found, however, in the practice of the successful dairymen, that in order to encourage the largest secretions of milk in stalled cows, one of the best courses is to feed in the morning with cut feed, consisting of hay, oats, millet or cornstalks, mixed with shorts, and Indian, linseed, or cotton-seed meal, thoroughly moistened with water. If in winter, hot or warm water is far preferable to cold. If given at milking time the cows will give down their milk much more readily. The stalls and mangers should first be well cleaned Roots and long hay may be given through the day, and at the evening milking, or directly after, another generous meal of cut feed, well moistened with water, and mixed, as in the morning. The process of digestion in a cow, or other bovine, goes on best when the stomach is distended, and for this purpose bulky food is almost as necessary as nutritious aliment. The flavor of some roots and vegetables, as cabbages and turnips, is more apt to be imparted to the milk when fed on an empty stomach than otherwise. Dairymen who wish to excel in the care of their cows curry them each day, though many do not practice this laborious treatment. An excellent feed for cows in the winter is the hay from the second crop of clover, well cured to prevent heating, becoming musty or rotting. The flow of milk from this kind of feed, accompanied by carrots or sugar beets, is greatly stimulated. Milk may be regarded as a material for the manufacture of butter and cheese; and according to the purpose for which the milk is intended to be employed the cow should be differently fed. Butter contains carbon, oxygen and hydrogen, and no nitrogen. Cheese, on the contrary, is rich in nitrogen. Food which contains much fatty matter, or substances which in the animal system are readily converted into fat, will tend to increase the proportion of cream and milk. On the other hand, the proportion of caseine or cheesy matter in milk is increased by the use of highly nitrogenized food. Those, then, who desire much cream, or who produce cream for the manufacture of butter, select food likely to increase the proportion of butter to the milk. On the contrary, where the principal object is the production of milk rich in curd, clover, peas, bran, and plants which abound in the desired elements, should be fed. The practice of "soiling," or stall feeding, or feeding in the yard the year round—summer as well as winter—has been on the increase for the last 20 years. This subject is elsewhere treated under its appropriate head. It can be said here, however, that for the perfect feeding of cows for profit, when pastures become short in the summer or fall, green food, grown for the purpose, should be cut and fed to them, so that they may not fall off in flesh or milk production. Uniformity of feeding and abundance of food the year round should be constantly held in view by the keeper of cows. The most natural and healthful food for cows is, of course, green grass; hence succulent vegetables and roots are always grateful to milk cows, and plenty of good, pure water is a thing indispensable.

Shelter and Kindness. No animals feel the influence of kindly treatment and protection more than cows, and the milk-pails invariably show the character of their treatment in these respects. The less cows are exposed to the cold of winter the better. They eat less, thrive better, and give more milk when housed all the time than when exposed to the cold. During spring and fall, and even summer, there often occur violent storms, and in the two former seasons the weather is cold. At such times, though the herd has been turned out to pasture, the cows should be driven to shelter. Kindness of treatment is another important requisite in the management of cows. They should always be driven slowly, and never dogged into a run to and from the pasture. Quietness in the stable or yard during milking time, and a kindly tone of voice, will tell on the disposition of the cows. All whipping, pounding, kicking, or other maltreatment of cows should never be indulged in.

Milking. Frequent milking at perfectly regular intervals, is essential to the maintaining of a regular secretion of milk, and has a powerful effect in increasing the quantity of it. Every milking ought to occur at precisely regular intervals from the preceding; for if later than that interval, it will allow the udder to be gorged, and to throw back a portion of its contents into the cow's system by absorption; and if earlier than the interval, it will occasion the udder to have too small capacity for the milk which would naturally be secreted during the longer interval that is to follow. Every drop of milk, also, ought to be drawn off at each milking; for when any portion is allowed to remain, it seems to be absorbed back into the system, or to serve as an indication to the secretory vessels to secrete a proportionately less quantity during the following interval. Thus we see how easily a cow can be "dried up."

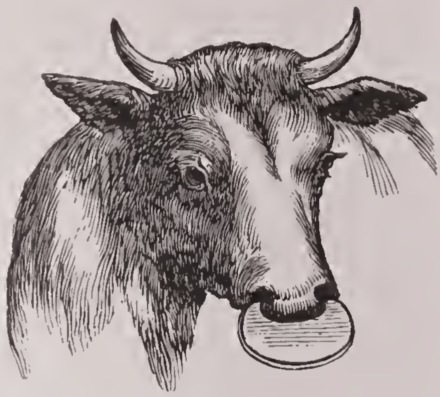


Fig. 8.—*Nozzle Board, in Place.*

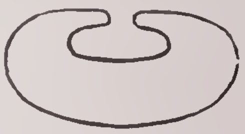


Fig. 9.—*Nozzle Board.*

To Prevent a Cow Sucking Herself. A very simple, and said to be effective means, is to take a tough hickory stick 14 inches long, ¾ of an inch thick in the center, sharpened to a point at each end; cut a groove around the center, half an inch wide, and half the depth of the thickness of the wood. Whittle each end nicely to a point, or leave it somewhat blunt, and insert a sharpened piece of wire in each end. Make a hole in the animal's nose, in the soft portion, but close up to the hard membrane of the nostrils, as you would for ringing a bull, and small enough so it will require considerable pressure to slip the bulge of the stick until it reaches the middle notch, when it will remain fixed. This does not prevent the animal from feeding, nor being fastened in stanchions; and it must be an inveterate sucker that will draw her milk with this jewel in her nose.

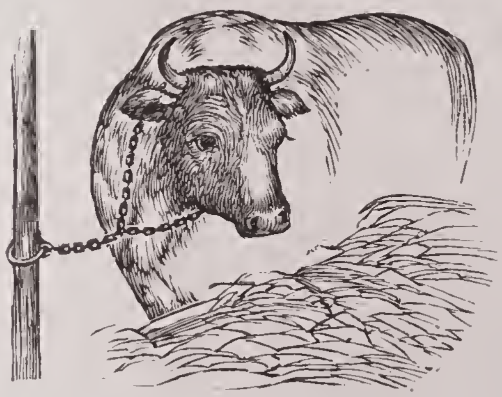


Fig. 10.—*Self-Adjusting Cow-Halter.*

To Prevent Kicking. Tie the cow in the stable with a good strong chain, then draw a strong cord quite tightly around the girth, or buckle a strap around the legs and fasten it to a ring in the wall behind, so the cord will be loose when at rest, and yet so tight that the cow cannot get her leg forward to do mischief.

Tying a Cow. A most excellent manner of tying a cow is illustrated by Fig. 10. A short chain is fastened around her neck and to a ring which plays loosely around an upright post. This prevents her from becoming entangled in it and gives her power to move at will.

In making this tether use a piece of half-inch rope, 50 or 60 feet in length, and two iron stakes. These stakes should be of three-quarter inch iron, and 18 inches long, and pointed at the lower end, so as to drive into the ground readily. The upper ends are turned to form an eye, just large enough to admit the rope, each end of the rope being put through the eye in one of the stakes, and knotted. The rope being stretched in the desired portion of the pasture, the cow is attached to this by a rope or small chain, 10 or 12 feet long, or of such length as the abundance of the pasturage may make desirable. This, which is the tether proper, has at one end an iron ring, large enough to pass over the eyes at the ends of the stakes, and the other end is fastened around the cow's horns, observing always to have a swivel in the center of this chain or rope. Use is shown in Fig. 11.

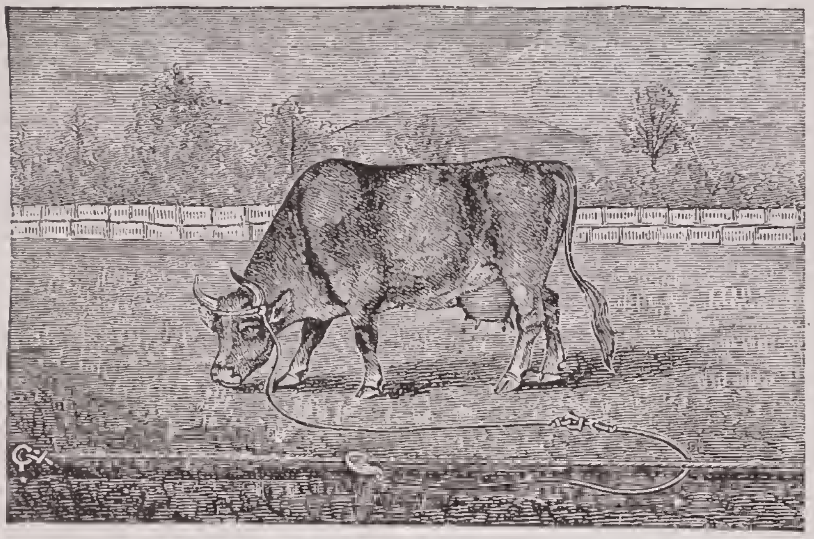


Fig. 11.—*A Double-Staked Tether.*

This will be found an excellent method of staking out cattle, as it is impossible for cows to snarl themselves up, as they are apt to do with a long rope fastened at one end. It is also a great saving, as the rope will last much longer than when a great length is drawn around through the wet grass. Another thing in its favor is, you can stake the cow on a long narrow strip, as on the border of a piece of grain, by shortening the rope or chain by which she is attached to the horizontal rope.

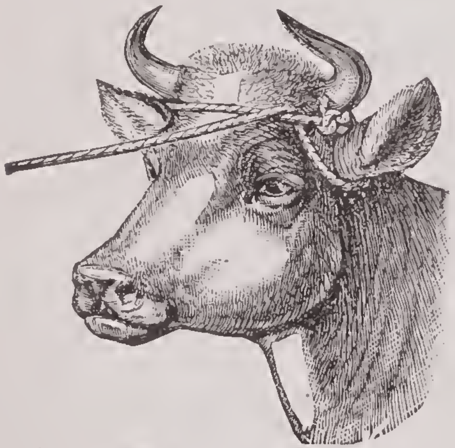


Fig. 12.—*Manner of Leading a Cow.*

By Fig. 12 we illustrate an excellent method of leading a cow. After the halter has been attached to the cow's horns take a half-hitch in it around one ear in such a way that it will not slip off. The engraving shows how this is done better than words can describe.

Parturition. This is an operation of nature which most farmers are familiar with, especially with cows. Before speaking of the delivery of the calf we give such information as will enable the farmer to tell whether his cow is pregnant or not.

Pregnancy. The symptoms of pregnancy in its early stage were formerly deemed unsatisfactory. The period of being in season, which commonly lasts three or four days, and then ceases for awhile and returns in about three weeks, might entirely pass over: and, although it was then probable that conception had taken place, yet in a great many instances the hopes of the breeder were disappointed. It was not until between the third and fourth months, when the belly began to enlarge, or, in many cases, considerably later, and when the motions of the fœtus might be seen, or, at all events, felt by pressing on the right flank, that the farmer could be assured his cow was in calf. The greatest of improvements in veterinary practice, the application of the ear to the chest and belly of various animals, in order to detect by the different sounds, which after a short time will be easily recognized, the state of the circulation through most of the organs, and, consequently, the precise seat and degree of inflammation and danger, has now enabled the breeder to ascertain the existence of pregnancy at as early a stage as six or eight weeks. The beating of the heart of the calf may then be distinctly heard, twice, or more than twice as frequently as that of the mother; and each pulsation will betray the singular double beating of the fœtal heart. This will also be accompanied by audible rushing of the blood through the vessels of the placenta. The ear should be applied to the right flank, beginning on the higher part of it, and gradually shifting downward and backward. These sounds will thus soon be heard, and cannot be mistaken.

Treatment before Calving. Little alteration needs to be made in the management of the cow for the first seven months of pregnancy, except that, as she has not only to yield milk for the profit of the farmer, but to nourish the growing fœtus within, she should be well, yet not too luxuriantly fed. The half-starved cow will not adequately discharge this double duty, nor provide sufficient nutriment for the calf when it is dropped, while the cow in high condition will be dangerously disposed to inflammation and fever, when, at the time of parturition, she otherwise would be susceptible of the power of every stimulus. If the season and the convenience of the farmer will allow, she will be better at pasture, at least for some hours each day, than when confined altogether to the cow-house.

The reason most commonly given for letting the cow run dry for a month or two before calving is, that after a long period of milking, her system requires rest, that she will give more milk and do better the coming season than if milked up to the time of calving. This is all true, and a reason sufficient in itself for drying off the cow some weeks before parturition; but there is another important reason for the practice, which is, that the mixture of the old milk with the new secretion is liable to end in an obstinate case of garget. To prevent any ill effects from calving, the cow should not be suffered to get too fat, which high feeding after drying off might induce.

Calving. The period of gestation is about 284 or 285 days; but cows sometimes overrun their time, and have been known to go 315 days, and even more, while they now and then fall short of it and have been known to calve in 220 days. If they go much over the average time the calf will generally be a male.

Cows are sometimes liable to slink their calves, and this usually takes place about the middle of their pregnancy. To avoid the evil consequence, as far as possible, they should be watched, and if a cow is found to be uneasy and feverish, or wandering about away from the rest of the herd and apparently longing for something she cannot get, she ought to be taken away from the others. If a cow slinks her calf while in the pasture with others, they will be liable to be affected in the same way. In many cases physicking will quiet the cow's excitement in the condition above described, and prove of essential benefit. A dose of 1 pound of Epsom or Glauber salts, and 1 ounce of ginger, mixed in a pint of thick gruel, should be given. First give the ginger and immediately follow with the salts in a little thinner gruel. When the cow once slinks her calf, there is great risk in breeding from her. She is liable to do the same again. When the slinking is caused by sudden fright or over exertion, or any offensive matter, such as blood or the dead carcasses of animals, this result is not so much to be feared. When about to calve the cow ought not to be disturbed by too constant watching. The natural presentation of the fœtus is with the head lying upon the the fore legs. If in this position, nature will generally do all. If the presentation is unnatural and the labor has been long and ineffectual, some assistance is required. The hand, well greased, may be introduced and the position of the calf changed; and when in a proper position, a cord should be tied round the fore legs above the hoofs; but no effort should be made to draw out the calf until natural throes are repeated. If the nostril of the calf has protruded, and the position is then found to be unnatural, the head cannot be thrust back without destroying the life of the calf. The false position most usually presented is that of the head first, with the legs doubled under the belly. A cord is then fixed around the lower jaw, when it is pushed back, to give an opportunity to adjust the fore leg, if possible. The object must now be to save the life of the cow.

The cases of false presentation, though comparatively rare, are so varied that no directions could be given which would be applicable in all cases. After calving the cow will require but little care, if she is in the barn and protected from changes of weather. A warm bran wash is usually given and the state of the udder examined. Calving, however, is often attended with feverish excitement. The change of powerful action of the womb to the udder causes much constitutional disturbance and local inflammation, may extend to the whole system and cause milk fever. For description and treatment of this disease, refer to it under head of Diseases, in Cattle article.

Retention of the Placenta, or Afterbirth. If the cow is gone her full time with calf, and is in a healthy condition, the afterbirth will not be retained long after she has given birth to her calf. When a cow does not cleanse properly and within a reasonable time, there is then something otherwise wrong with her health, such as debility or want of vitality in the system. It is this that must be looked to, and not the want of timely cleansing that demands attention, as being the cause of the cow not doing well after calving. Remedy these existing causes and the cow will cleanse well enough. Contrary to the generally received opinion of the farmers and others, the retention of the afterbirth for a day or two will do no harm provided that decomposition does not take place in the afterbirth; for, in such cases, the whole system of the cow is apt to be contaminated and poisoned.

Treatment. Cows not having cleansed properly within twenty-four hours after calving, should be given the following mixture: Epsom salts, 1 pound; powdered fœnugreek, 1 ounce; caraway seeds, ½ ounce; mix, and give in three or four bottles of warm ale, porter, or warm water, sweetened with molasses. This mixture not having the desired effect in twelve hours, the hand, well-greased, should be introduced, and the afterbirth at the attachments, called cotyledons, gently pressed. This must be accompanied with much pulling, as pressure with the finger and thumb will be all that is wanted. This operation may be followed by giving the cow a little warm ale or molasses-water, with half an ounce of powdered ergot of rye; and, in half an hour, an additional half ounce. This will cause contraction of the womb and expulsion of the placenta. When decomposition or putrefaction of the afterbirth has taken place, which is known by the black color, the womb should be well washed out with a weak solution of chloride of lime. Administer, also, by the mouth, one ounce, three times in a day, of sulphate of soda for a week, to neutralize any of the poison of putrefaction that may have been absorbed into the blood. Give the cow good and nutritious feed to support her strength.

Spaying. This is the name given to an operation for the removal of the ovaries, or female testicles, from the milch cow and young female cattle. The object of the removal of the ovaries from young cows that never have had a calf, is to prevent them from ever having a desire for the male, so that she will be more easily fattened and fitted for market. Young cows so operated upon are continued to be called heifers.

The Advantage of Spaying Cows. The following are the reasons why dairymen should spay their cows, when not intended for breeding:

1. Spayed cows are more easily kept in good condition than cows not spayed.

2. They are less liable to sickness of an epizootic kind, and when sick, more certainly and easily cured.

3. When epizootic diseases are present in the vicinity, or even in the herd, spayed cows are always in condition and fit for the butcher. To prevent loss and save expense in the treatment, with the attendant risk of loss of some, and loss of condition and milk of all that are affected, they can be sold without loss—which is not the case with cows not spayed, and when pleuro-pneumonia is among them.

4. Spayed cows give the same quantity and quality of milk all the year round if they are properly fed and cared for.

5. Ten spayed cows will give the year around as much milk as double the number of cows not spayed, thus saving an interest on the outlay for ten cows, together with absence of risk from loss of some of the principal by death of one or more, by sickness or accident, not to speak of the feed of ten cows. Between the feed of ten cows and their manure, the farmer can best estimate the difference in value.

6. With spayed cows there is no risk to run from milk fever, nor trouble with cows called bullers.

7. To fatten a cow, spay her instead of giving her the bull, as is the present custom, by which feed and time are consumed, and the animal is not made very fat after all; for she has to provide the fattening substance to the calf in the womb, which, if she had been spayed, would have been appropriated to herself; nor is this all, for the calf in the belly is at once discounted by the butcher, as it is not a salable article in market.

8. Spayed cows have no calves to slink.

Having thus had a bird's-eye view of the advantages to be derived from spayed cows, let us look in the same manner at the disadvantages of spayed ones.

1. The expense of the operation and attendant risk of tbe animal dying—although this is not great—(about one in a hundred). The expense of the operation will be from $3 to $5, which will depend upon the distance the operator has to travel, and how many animals are to be operated upon.

2. Spayed cows are apt to accumulate fat and flesh, so that they will become dry much sooner than cows not spayed. Still there can be little loss, for a fat cow is always ready for sale. These, then, are the objections to spaying of cows, if objections they may be called.

Diseases. Notwithstanding the frequent and sudden changes to which our climate is subject, the diseases to which dairy-stock are liable with us are not numerous, and if judiciously treated may, in most cases, be made to yield to ordinary remedies. Pure air, pure water, good pasture, and thoroughly clean stalls, with a frequent, judicious, and gradual change of food, keep dairy-stock in a condition which is the best preservative against disease. Nature, unassisted, is then able to fight down any ordinary ailment. The barbarous antiquated methods of bleeding, boring the horns, and cutting off the tail, etc., should never be thought of by enlightened people of this day. For diseases of the cow and treatment, see Diseases, in Cattle article.

Cowhage (cow'hage), spelled also "cowage," "cow-itch," etc., is a plant whose pods have small bristles. The pods can be obtained at drug stores.

Care must be used in removing the bristles, for they are like nettles, and if they come in contact with the hands or face, or any part of the skin, they will produce a most distressing itching. The bristles or down which covers the pods is used as a never-failing remedy for worms, acting mechanically, by cutting and piercing them to death, when they are expelled by a brisk cathartic, to be given the next day. The manner of using it is to carefully scrape it from the pod in a little molasses, until you have got about a teaspoonful of the article into a tablespoonful or two of molasses; it is then to be put carefully into the mouth, and swallowed so that none of it gets upon the skin outside. Cowhage does not seem to make any impression on mucous surfaces, and therefore produces no injury to the patient after once fairly in the mouth and swallowed. With proper care, therefore, in handling, it may be regarded as a safe and very certain remedy for worms. The dose is from one to two teaspoonfuls, given in molasses, to be followed always, in about twelve hours afterward, with an active purgative. Should any of it get on the hands, or other parts, and produce itching, apply sweet oil or lard.

Cow Pea, the Southern bean; one of the most valuable forage crops of the South. It grows luxuriantly, smothering down all weeds; valuable even to plant between rows of potatoes, or other farm plants, to keep down weeds. Late in the season it is mowed off, and is easily preserved in silos for winter use. Or it can be pulled up and ensilaged, and during the winter the cattle will eat it roots and all. Where the seed matures, it makes a highly nutritious soup. There are different varieties—black, white and black-eyed.

Cow Pox, in farriery, a disease affecting the teats of cows. This disease appears in the form of bluish vesicles surrounded by inflammation, elevated at the edge and depressed in the center, and containing lymph. By the use of the virus of this disease has originated the present system of vaccination as a preventive of the dreaded small-pox.

Crabapple: see Siberian Apple, page 34.

Cracker. The fundamental idea of cracker, as an article of food, is a small, unleavened, crisp cake, made from flour, and so dry that it will keep for a long time, deriving its name from the fact that it "cracks" between the teeth when one is eating it. This definition suggests, also, the main principles to be observed in making them. Home-made crackers are better than those sold at the groceries.

Common Crackers. Take butter, one cup; salt, one teaspoon; flour, two quarts. Rub thoroughly together with the hand, and wet up with cold water; beat well, and beat in flour to make quite brittle and hard; then pinch off pieces and roll out each cracker by itself, if you wish them to resemble bakers' crackers.

Soda Crackers. Take nine cups of flour, before sifting, one cup of lard, two teaspoonfuls of salt, one of soda (and two of cream tartar, if you like); rub all thoroughly in the flour, then add two cups of cold water, mix well and roll thin, prick with a fork and bake quickly.

Sugar Crackers. Flour, 4 pounds; loaf sugar and butter, of each, ½ pound; water, 1½ pints. Make as above.

Oatmeal Crackers. Sift three cups of oatmeal and mix it with two cups of rich milk. Set in a cool place for six hours. Sift a cupful of Graham flour with a teaspoon of salt and one of baking powder. Work this into the oatmeal to make a dough. Roll the dough to the thickness of a quarter of an inch, using corn meal to dust the board. Cut into squares, lay on a greased tin, wash the surface with milk, and bake in a moderate oven for about fifteen minutes, being careful not to let them burn.

BREAD CRACKERS. Take 1 pound of bread dough after it has risen; add two ounces of butter or lard; work well in dough; let rise again; roll out very thin; cut in cakes and bake till dry.

GRAHAM CRACKERS. Have some soft water, either cold or tepid, in a mixing dish, and sift nice Graham flour slowly through the fingers into the water, stirring it in until too stiff to manage with the spoon; then mold the dough on a board with the hands until it is about as stiff as for common biscuit. Roll it with a rolling-pin about three-fourths of an inch thick, cut with a round cookie cutter, and lay on a baking tin, not greased but dusted with flour, so the cakes will not touch each other. Bake about thirty minutes in a pretty hot oven, making them sharp and crusty or tender as preferred. Take them from the oven into a pan or bowl and lay a napkin over them to steam awhile, then lay them in neat little piles on plates for the table. The "Graham crackers" sold at the groceries, either sweetened or unsweetened, are no more healthful than those made of bolted flour, for there is in reality very little Graham flour in them.

TO FRESHEN old crackers, put them into a hot oven for about three minutes.

The ADULTERATION of city-made or "store" crackers consists mainly in using poor flour, rotten dough, sulphuric acid, ammonia, etc. All cheap crackers are unfit to eat, while a high price in no wise insures a good article.

Cradle, for cutting grain, a scythe furnished with slender wooden fingers to gather and lay the grain evenly.

Cramp Colic: see Colic.

Cramps are irregular spasmodic contractions of the muscles of the whole or different parts of the body, causing most severe pain by the knotty and hardened state into which their fibres are contracted. Though cramp may involve the greater number of the muscles at once, the parts most generally affected are those of the feet, legs, thighs, abdomen and arms. The cause sometimes proceeds from the sudden application of cold to the heated body, damp sheets, wet feet, or wet clothes; the irritation produced on the nervous system by the absorption of lead, arsenic, or other mineral poisons, and the exhaustion on long-continued evacuations, as in cholera; from the specific action of some animal virus, as in the bite of venomous reptiles, and in bathing, from coming in contact with cold springs, and a too lengthened stay in the water.

TREATMENT. Friction will always be found the most valuable means for subduing cramps whether general or local; and if nothing else can be obtained the hand alone, or a piece of flannel, if properly used, may be always made of service. When a hot bath can be obtained, it should always be employed immediately, and friction used while in the water. For the more local kinds of cramp, fomentation, an embrocation of camphorated oil, turpentine and spirits of hartshorn is to be employed, rubbed in with the hand in the direction of the muscular fibers. The only internal remedy demanded is an occasional draught, composed of 1 ounce of brandy, ½ drachm of sal-volatile, 25 drops of laudanum, 15 drops of ether, and 2 ounces of water. See Drowning.

Cranberry. The cranberry is a familiar trailing shrub growing wild in swampy, sandy meadows and mossy bogs in the northern portions of the United States east of the Missouri river, and producing an elliptical, or oval, very acid, red fruit.

CULTIVATION. With a machine or otherwise pare off the surface of a swamp or meadow, where inundation is practicable, cover the surface with a few inches of sand, set out the plants 12 to 18 inches apart, either with or without their roots, keep them clean from weeds and grass two or three years, and they will cover the ground, producing the first year after this probably 50 bushels to the acre, the next year 100, and after that possibly 200 to even 400 bushels per acre; but 80 to 100 is the average. Peaty soil is good almost anywhere in the latitude of the Lake region. Flooding is not necessary until the third winter, unless destructive insects appear. To destroy insects the flooding should be continued to the first of June. It is well to have ground that can be drained somewhat. Cranberries can be raised upon clay land by covering it with sand and irrigating, but this process would hardly pay while the fruit grows so abundantly in the Northern and Eastern portions of the United States with scarcely any cultivation at all. A piece of ground 20 feet square will yield three to four bushels annually, which is quite enough for a family. The plants are easily procured, being generally taken up in square sods like grass. The planting can be done from March until the middle of May, or from September until the ground freezes. The fruit is gathered either by hand or with a cranberry rake, one man being able generally to gather about 30 bushels a day, and, for market, it is put in slatted bushel boxes.

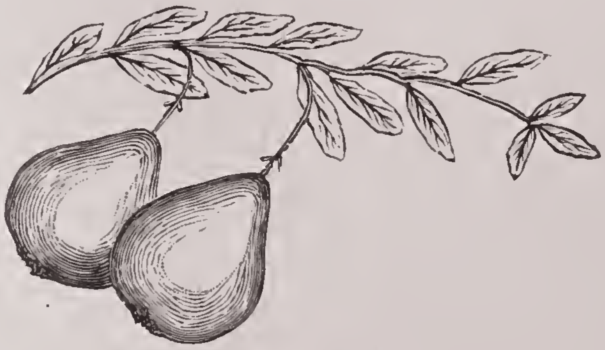


FIG. 1.—*Bell Cranberry.*

Early and late flooding will keep off all insect pests, but in the Lake region the pale laurel, or wild sage, is a most formidable enemy. Better gather all this shrub, root and branch, and burn it up, before setting out the fruit plants, and ever afterward treat it as you would Canada thistle.

VARIETIES. The Bell-shaped Black cranberry is the largest and most profitable. The fruit when ripe is a bright red color, but is the darkest red of all the varieties. Next are the Large and Small Cherry, then two kinds of Bugle, Oval or Egg-shaped, Large and Small, and the Small Gray, which are not so highly colored.

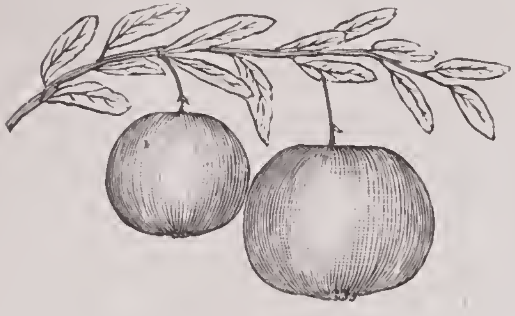


FIG 2—*Cherry Cranberry.*

Crane, in mechanics, swinging bar or frame, generally with pulleys, for raising heavy objects and swinging them around to another place, as in loading and unloading stone.

Crayon (cra′ on), a piece of chalk, or other soft stone, usually in the form of a cylinder, or a composition of earths, variously colored, stiffened with some tenacious substance and made into sticks or cylinders, to be used in drawing. The best kind for home use is made of charcoal, thus: Saw the finest-grained, softest and blackest pieces of charcoal (willow is best) into slips of the size required, put them into a small vessel of melted wax, and let them macerate over a slow fire for half an hour, then take them out and lay them on blotting paper to dry. The same process will do for chalk of almost any color. Drawings made by such crayons are very permanent; and if the canvass or paper is warmed a little on the opposite side, the picture becomes as durable as ink.

Crape, BLACK, HOW TO CLEAN. Take skim milk and water and mix a little glue with it, and make it scalding hot. If chapped and pulled dry it will look as good as new.

CRAPE SCARF, TO WASH. Make a strong lather of boiling water and permit it to cool; then wash the scarf as quickly as possible, dip it immediately in hard water in which a little salt has been thrown (to preserve the colors), rinse, squeeze and hang it out to dry.

Cream, the fatty constituent of milk, composed of buttery globules covered with a thin film of cheesy matter. All that regards the treatment of cream in butter and cheese-making will be found under the heads "Butter" and "Cheese." When it is intended to send the cream to market, the same observations will apply to it as are made touching the keeping of milk. Cleanliness, a uniform, low temperature, and the least possible agitation are indispensable to the production of a first-rate article. As stated elsewhere, the greatest amount of cream is secured by the addition of a little water to the milk when it is set; but the milk remaining is correspondingly impoverished. Cream rises much more rapidly and in somewhat greater quantity on milk placed on shelves about six feet high than on the ground. Cream is usually skimmed from the milk at periods of 12 and 24 hours. The morning's milk is skimmed in the evening; the evening's milk in the morning.

At a temperature of 80°, all the cream will rise in 10 hours; at 77°, in 12 hours; at 68°, in 18 hours; at 55°, in 24 hours; at 50°, in 36 hours; and at 45°, in 43 hours.

Cream is raised by the use of the centrifugal machine, the principle being that the milk, which is heavier than the cream, will be thrown farther from the centre of the machine, forming an outer wall of liquid which may be easily drawn away from the inner wall of cream. This system is hardly adapted to dairies of less than 200 cows. The milk is at a temperature of about 80°, and the capacity of the machine about 500 pounds of milk per hour.

It is claimed that the Fairlamb milk-can (Fig. 1) is a great advance in the right direction, as far as cream-gathering is concerned. The exact amount of cream is shown in inches and eighths of an inch on a glass gage in the side of the can. Where cream is bought by the inch, as is the case with most creameries, the convenience of this arrangement to the farmer is manifest. The can is 17½ inches high, 12 inches in diameter at the top and 10½ at the bottom, provided with a tube in the center for cooling the milk. It has a tin cover with a rubber band around the rim, which renders the can, when covered, air-tight. It holds seven and a half gallons, or 70 pounds of milk. The inch of cream is held to be one pound. The objections urged against this system are: That in no can is an inch equal to a pound all the year round; that a can which will hold out full in June, will fall short from September till May; that whether or not an inch in any can will hold out depends on the manner of setting, the temperature, the time and frequency of skimming.

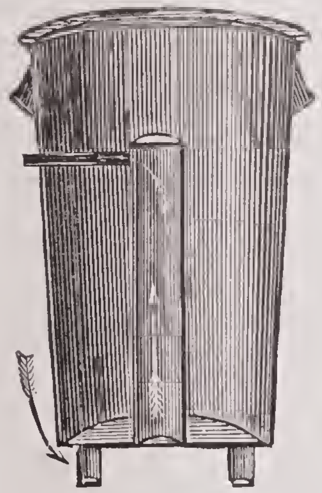


FIG. 1.—*Fairlamb Milk Can.*

The Cooley system (Figs. 2, 4, 5) consists in setting the cans of milk in a reservoir, where they are submerged in water of the proper temperature, namely, 45° to 55° in the spring and summer, and 40° to 50° in the winter, by which process the cream is all forced up in 12 hours. The cans have tight-fitting covers (Fig. 5) preventing the ingress of water. The cream is sweet, with all the natural aroma retained. The advocates of this system claim there are no disagreeable or unhealthful animal odors to be dispelled, and that only one-

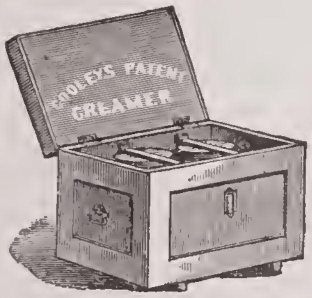


FIG. 2.—*Cooley's Creamer.*

fourth the capacity of open vessels is required. The Cooley cans are 20 inches deep and 8½ inches in diameter. It is manufactured by John Boyd, Chicago, Ill. A. H. Reid's creamer is illustrated by Fig. 3.

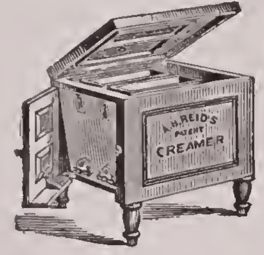

A. H. REID'S PATENT CREAMER

Fig. 3.-*Reid's Creamer.*

By all these systems the housewife is relieved of much of the drudgery in making butter, and is enabled to make it more uniform and of a more excellent quantity. Or, by the use of these cans, the cream can be taken to a factory and the milk kept at home to be fed to animals.

Cream as a food is exceedingly nourishing, but where the digestion is not good it should be avoided.

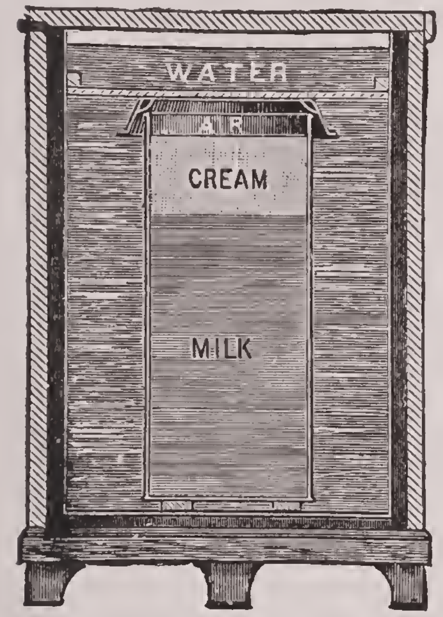


Fig. 4.-*Cross Section of Creamer.*

Cream, as a special preparation for dessert, is a nice, delicate and popular dish. We give the best recipes.

Coffee Cream. Put three quarters of a pint of boiled milk into a stew-pan, with a large cupful of made coffee, and add the yolks of eight well beaten eggs and four ounces of pounded loaf sugar. Stir the whole briskly over a clear fire until it begins to thicken, take it off the fire, stir it for a minute or two longer, and strain it through a sieve on two ounces of gelatine. Mix it thoroughly together, and when the gelatine is dissolved pour the cream into a mold, previously dipped into cold water, and put the mold on rough ice to set.

Lemon Cream. Pare into a pint of water the peels of three large lemons; let it stand four or five hours; then take them out and put in the water the juice of four lemons and six ounces of fine loaf sugar. Beat the whites of six eggs and mix it all together, strain it through a lawn sieve, set it over a slow fire, stir it one way until as thick as good cream; then take it off the fire and stir it until cold, and put it into a glass dish.

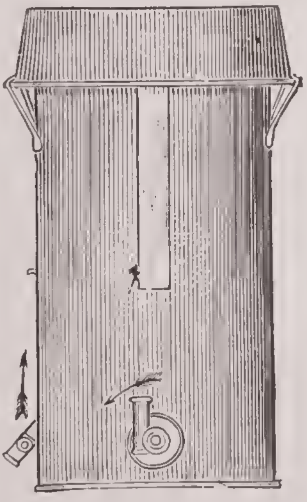


Fig. 5.-*Milk Can Creamer.*

Orange Cream may be made in the same way, adding the yolks of three eggs.

Tapioca Cream. Soak a teacup of tapioca over night in milk. The next day stir into it the yolks of three eggs, well beaten, and a cupful of sugar. Place a quart of milk on the fire; let it come to a boiling point and then stir in the tapioca and let the whole cook until it has thickened; then take it off the fire and stir in the whites of the eggs, beaten to a froth. Flavor to taste. A small portion of the beaten whites of the eggs can be saved to decorate the top. Stir into the latter a little sugar, put it into a paper funnel, press it out over the pudding according to fancy and place it in the oven a few moments to color; or the whole top of the pudding may be covered with the meringue, more white of eggs being necessary in this case. This is a delicious dessert.

Velvet Cream. Put one ounce of isinglass into a stewpan with a large cupful of white wine, the juice of a large lemon, and sufficient sugar to sweeten it rubbed on the peel to extract the color and flavor. Stir it over the fire until the isinglass is dissolved, and then strain it to get cold. Then mix with it the cream and pour into a mold.

Cream Cheese. Take strippings (the last portion of a milking), or milk and cream, turn it with a little rennet, add a little salt and sugar, if desired, place in a small square vat, and press out the whey with a weight of two to four pounds; after about 12 hours, place it upon a board and turn it every day until dry. In about three weeks it will be ripe.

Creamery, a factory where butter (and also cheese) is made under systematic management. See articles Cream, Butter and Dairy.

Cream of Tartar, a neutral salt deposited by wine upon the sides of the cask, and afterward purified by boiling and crystallizing. It is generally boiled a second time, decolorized with charcoal and clay, allowed to cool slowly, and the resulting crystals form the "cream of tartar" of commerce. Used extensively in medicine and in cookery. Its medicinal properties are numerous. It is a cooling laxative, and diuretic. Seldom given alone, but combined with antimonials, mercurials, or sulphur, as an alterative in skin diseases, and used as an adjunct to aloes in purging-balls. Cattle require 2 or 3 ounces; when given in larger doses it should be given in plenty of warm water. Sheep require ½ to 1 ounce; dogs, 5 to 20 grains.

Creasote (cre′-a-sote), a volatile oil distilled from wood-tar, is of a peculiar smoky odor, and within the vital domain is irritant, narcotic, styptic and antiseptic. Often used upon indolent ulcers, aching teeth and in various general diseases. Creasote has had the credit of curing glanders in man, and is a good remedy in pleuro-pneumonia in cattle, and cases of farcy and glanders in the horse are greatly benefited by its use.

Dose. For horses and cattle, use from 1 to 1½ drachms, made into a mass, with flour and molasses, and the whole crumbled down into some gruel. Make a drench to be poured down the throat. As an external remedy it is of great advantage in mange, sores, ulcers, caries of the bones, canker, thrush in the horse's feet, and the foot-rot, so troublesome in sheep. Indeed, the more the virtues of creasote are known to farmers, raisers and breeders of stock, the more will it be valued, and the greater will be the advantages derived from it.

Cress. This is a mustard-like plant, used as salad and for garnishing before the flowers appear. Plant on rich soil, finely pulverized, in drills six or eight inches apart. That grown in the cool of the season is of the best quality. The curled variety is the best; the plain or common is next, which has been called pepper-grass, probably a corruption of pepper cress. The famous English water-cress has to be planted in the margin of a running stream.

Creve-Cœurs (crave-curz'), a breed of domestic Fowls; which see.

Crickets. Crickets belong to the jumpers, which include crickets, grasshoppers and locusts. They are by far the most prolific and most destructive of orthopterous insects. There are a number of varieties, of which the common black cricket is the most abundant. Like the locust, scarcely anything in the way of herbage seems to come amiss. They are also destructive to many dry substances, as woolen or cotton cloths, left in the open air during the season of their feeding, especially in the fall. Crickets may be poisoned by laying in their way grated carrots or potatoes mixed with a small quantity of arsenic; but it is not feasible, since when scarce they do comparatively little harm, and when they swarm in countless numbers this means is not practical. Hogs are fond of them, and hunt them assiduously. Crickets eat such insects as they can master. They lay numerous eggs, which they deposit in the ground by means of their ovipositor. At the approach of cold weather the greater part of them die, but a few hybernate, sheltering themselves beneath stones or other places secure from water and the inclemency of the winter. The American crickets, unlike the European species, do not make their homes in houses. Those found in living-rooms are chance individuals which have wandered there. The large wingless crickets, or grasshoppers, generally live on the ground or on low growing plants; some are found in caves or under stones, while others are found on wild grass and herbage. Some species are found in immense numbers on the Western plains, where they feed upon weeds or any green plant that may occur in their vicinity. In the Eastern States many species inhabit the woods or dark, damp places, and if disturbed, hide under stones or rubbish; they are, however, at present not known to destroy the crops to any considerable extent; and if they do, the same remedies may be applied as above. The cricket in this country injures grass, melons, squashes, potatoes and other roots and fruits. The eggs of the field cricket are deposited in the fall or autumn in the earth, and hatch the following season, some of the old insects surviving throughout the winter under stones, dead fallen trunks of trees, etc. To destroy house-crickets, vials half filled with beer, milk, or any liquid will attract and drown them. A deep, glazed earthenware jar, having a little food, such as boiled potato or sliced cucumber in it, will serve as a trap for crickets, for when once in, they are unable to jump out again. Pills made of arsenic or Paris green and flour, or these poisons mixed with grated carrots or mashed potatoes, will poison them; but if such deadly poisons are ever used, great care should be taken that the dead insects do not fall into any of the domestic kitchen utensils, nor should they be swept where domestic fowls can find and eat them. If field crickets are very numerous and annoying, many of the remedies recommended for grasshoppers, such as plowing up the earth and exposing it to the winter's frost or rains, or rolling the ground very early in the morning, will be of utility; but fowls, turkeys, and insectivorous birds are of inestimable value in destroying such insects as are found around the gardens and houses, if they can only be kept out of the gardens themselves. .

Crimp, in cookery, to cause to contract, or to render more crisp, as the flesh of a fish, by gashing it, when living, with a knife.

Crimping-Iron, an iron instrument for crimping and curling the hair.

Crockery, To Mend. Use white of an egg and lime. Take enough of the egg to mend one article at a time, shave off a quantity of lime, and mix thoroughly. It hardens very quickly, and only a small quantity should be made at a time.

Crop, the season's yield of any given product of the farm. To "crop" a piece of ground is to raise some cultivated product upon it. See Farming, Rotation of crops, etc.

Crops, How to Estimate. Frame together four light sticks exactly a foot square inside, and with this in hand walk into the field and select a spot of fair average yield, and lower the frame square over as many heads as it will enclose. Shell out the heads thus enclosed carefully, and weigh the grain. It is fair to presume that the product will be the 43,560th part of an acre's produce. To prove it, go through the field and make ten or twenty similar calculations, and estimate by the mean of the whole number of results. It will certainly enable a farmer to make a closer calculation of what a field will produce than he can do by guessing.

Crops, Rotation of: see Rotation of Crops.

Cross and Cross-Breeding: see Breeding and Varieties.

Cross-Cut Saw, a large saw worked by a man at each end, for cutting logs.

Cross Tining, a harrowing by drawing the harrow back and forth across the same ground.

Croton Oil, an oil obtained from an East Indian plant, of a brownish yellow color, and hot, biting taste. This is the most powerful purgative known. One drop will operate upon the bowels in about forty minutes. A drop taken on the tongue will often move the bowels. It is so powerful that it should be very cautiously used. The dose is from one to three drops on a little sugar. Used externally it is a counter-irritant, producing redness of the skin and inflammation. It is a dangerous medicine when improperly used, but a useful one, nevertheless, when in the treatment of animals hasty action of the bowels is wanted, as in milk fever in cows.

Dose: For the cow, 10 to 15 drops, given along with Epsom or Glauber salts.

Croup. This dangerous and distressing disease, which is so prevalent among children, is an inflammatory affection of the windpipe. If the application of remedies were sooner made in cases of croup, the mortality from this formidable disease would be very much lessened. Unfortunately many parents are not familiar with those slight yet often distinctive symptoms that mark its early stage. In some few cases the attack is sudden, but generally it is preceded by the symptoms of a common cold, accompanied with hoarseness and cough. At this time the dangerous termination cannot always be perceived, but very often, in addition to the quickened breathing, the cough is rough and has a peculiar, shrill-like sound, something like the crowing of a cock or the barking of a dog. When the child draws in its breath there is a roughness in its sound which may be distinctly heard by placing the ear close to the mouth of the child. Even in this stage the windpipe is often painful. The child raises its hand to its neck as if to invite attention to the seat of the uneasiness. If proper measures would be taken at this stage most children would recover, but if parents wait till the breathing becomes much quickened and hoarse and the cough hard and tight and till fever has set in, the disase will be found difficult to control. Parents can better afford to be deceived half a dozen times than once to overlook a case of croup. We therefore earnestly recommend all parents immediately after discovering a roughened breathing and a resonant cough, and particularly if there have previously been symptoms of a cold, to lose no time in resorting to treatment. As the disease progresses the fits of coughing become more and more distressing, the child makes a great effort to breathe, the face is flushed, and the head is usually thrown back to escape suffocation.

Before giving the treatment for this dreaded disease we wish first to tell how it may be prevented. Croup seldom occurs during the first year of infantile life, most frequently in the second year and upward. When it has once attacked a child it is very liable to occur at any period before the thirteenth year of age. It is then very proper that the mother should be made acquainted with the means of prevention. They consist in being careful in the protecting of the child from cold or damp weather, particularly in the spring, or after heavy rains, or in cold, damp changes in the atmosphere; for croup is then more prevalent. The croup is often produced by the child sitting or playing in a room, newly washed out, when there is a predisposition to the disease. Then the child, every morning upon rising from bed, should be sponged all over with tepid water in which is put some salt, and rubbed well with a coarse towel. The clothing should be warm, the neck and arms well covered, flannel worn next to the skin throughout the year, and the bowels kept regular.

Treatment. In the treatment of croup we give a number of prescriptions, so if some remedies are not at hand others, which are about as efficient, may likely be. The best remedy which can be given to a child attacked with croup, is an emetic. A wineglassful of lard oil or goose oil will often answer this purpose where no better medicine can be obtained. An effective emetic can be given to a child in the croup, in a heaping teaspoonful of powdered alum, mixed with molasses or honey. This can be given every ten minutes until it vomits freely. The alum operates on the salivary glands, and makes them pour out the saliva or spittle in great quantities. In many cases this has acted like a charm, and relieved children supposed to be in the last stage of this disease. The tincture of lobelia in teaspoonful doses may be given every six or eight minutes till free vomiting takes place. The lobelia can hardly be given too freely in croup; in some cases, where the disease has been very alarming, as much as a tablespoonful has been given at a time with success. As soon as the emetic begins to operate, it should be promoted with a strong tea of sumac and bayberry. On first discovering the disease, give a quick tepid or warm bath, bathing well the head, throat, and chest; then give the emetic last named, and apply a wet bandage, well wrung out, about the throat, the seat of the disease, and warm applications to the feet, so as to produce prespiration as quickly as possible, the body being wrapped in a warm blanket immediately after bathing, so as to prevent the slightest exposure to taking cold. The warm applications to the throat should also be renewed from time to time, as may seem necessary; and the bowels kept freely open, perhaps, with castor oil and molasses mixed. A plaster of snuff and hog's lard, laid upon the chest, is often the best means at hand for relaxing the system and subduing the inflammatory action. A teaspoonful, mixed with a little lard and spread upon a rag, composes the plaster. It will sometimes make the child very sick at the stomach and vomit severely. When this is the case, or the vomiting continues long, it will be advisable to remove it until the sickness subsides. The drink should be flax-seed or slippery-elm tea, or some other mucilage. Equal parts of squills and castor oil, given in a dose of a teaspoonful every hour until it operates on the bowels, is one of the best remedies that have ever been administered. It quickens the secretion of the windpipe, at the same time producing general relaxation of the system by evacuating the bowels. A tea made of the Seneca root, or bloodroot, is a good solvent of the tough, slimy matter which clogs up the trachea or windpipe. Great care, however, should be taken not to administer medicine too fast. While the child is vomiting, nothing else should be given, unless it be a little drink.

It is always better to raise a sweat before you give any medicine to purge the bowels, as the two operations can not be well carried on at the same time. The purging of the bowels lessens the perspiration. Hive syrup should always be kept in every family, where there are young children; it will be found in this disease a most valuable remedy. The dose is about a teaspoonful, every ten minutes, until vomiting is produced. In the first stage of this complaint, a portion of raw cotton, wet with camphor, whisky, or vinegar, warm and applied to the throat, will be found useful. When the disease is far advanced, and not yielding to the treatment, a poultice should be applied to the throat, of red pepper, lobelia, slippery elm, pulverized, wet with hot water, and renewed when it becomes cool. After the removal of the poultice, some stimulating liniment should be employed to anoint the throat, composed of spirits of hartshorn, ½ ounce; spirits of turpentine, ½ ounce; laudanum, ¼ ounce; sweet or olive oil, ½ ounce; mix together; or if this liniment cannot be conveniently obtained, make applications of hot water or simple poultices of any kind, to the throat, as warm as they can be borne, changing them as they get cool.

An application of coal oil to the throat and chest has been found to be a very efficient remedy. Saturate a flannel cloth with the oil and tie around the neck. Some give it internally. Give 1 teaspoonful to a child three or four years old.

Powdered alum placed down the throat of the child will operate upon the salivary glands and make them pour out the saliva in great profusion. Ipecac is always a safe remedy, but is not powerful enough. Place the feet in hot water, keeping them there until vomiting takes place, laying cloths wrung out of hot water upon the breast and throat, changing often enough to keep them hot. But the non-medical method is to seat the patient in a warm place, or in a hot sitz-bath, where fresh air is constantly passing the face; put his feet in hot water, keep cold wet cloths upon the throat and head, and give a gentle emetic. If the attack is renewed the following night, do the same and send for a physician.

To control the fever give tincture of aconite and belladonna as follows: Put 5 drops of each in a half a glass of water and give the child 1 teaspoonful every half hour, until the fever subsides.

Crow. No other bird has been so strongly condemned by the farmers of this country as the crow. Indeed, so persistently has it been hunted that it has become the most wary of birds, and "as cunning as a crow" has become a proverb. There are few wild birds more energetic in hunting insects and verminous animals. They also eat such substances as would otherwise putrefy and taint the air. They are therefore always worthy of preservation and should be harbored rather then hunted to death. Should they molest the grain at planting time, which they will doubtless do, but to no great extent, the following very amusing and efficient remedy may be resorted to:

Take a piece of foolscap, or any other stiff paper; roll it into a funnel shape, and fasten with mucilage or needle and thread. Drop a few kernels of corn into the "foolscap," smear its sides with bird-lime, which may be obtained at the drug stores, and drop in the corn-field. The crow will reach in for the corn and find himself caught. There is considerable amusement in this sport, besides saving the loss of corn dug up by these black marauders. Don't kill the crows: They destroy myriads of insects that are injurious to vegetation.

The crow is easily domesticated and without great difficulty may by instructed to do many tricks and even to speak some words with amazing distinctness, and with the voice of a human being. When domesticated they become much attached to those who pet them, and will soon learn to follow them about the fields. It must be confessed, however, that they are exceedingly mischievous and are apt to carry away and hide small articles that come in their way.

Crown Scab, a cancerous sore formed around the corners of a horse's hoof.

Cruelty to Animals. Without the assistance afforded by the domestic animals mankind would be very helpless. The horse, the sheep, the ox, the ass, the camel, the elephant, the llama, the dog and the reindeer, are fitted peculiarly for the regions in which they are found, and each is indispensable to the comfort or safety of man. Some of these are no longer found in their wild condition, and are so completely domesticated as to have lost much of their natural instinct of self-defense and preservation. Many of these animals possess a sagacity that is wonderful. They have perception, memory, recollection, and often seem endowed with powers of reason and judgment. Some possess ardent affection for their masters, and a fidelity that nothing can disturb.

That man should treat such faithful servants with anything save the greatest kindness seems to be unreasonable; and yet, alas for man's weakness and passion! it is often true. It would seem that self-interest alone, without any higher or nobler motive, would prompt every man to take great care of the poor brutes, upon which he is so dependent; but even his own property is often made the sport of his baser nature.

Animals that afford us pleasure or profit should be treated with humanity, and every attention paid to their wants. If the innocent and helpless brutes, that are ill-fed, overworked, unsheltered, and injured by all manner of cruelty, could make an appeal to our sense of justice and humanity, how eloquent and how touching it would be! Neglect and abuse not only injure the pecuniary value of the animal, but what is of infinitely more importance, the moral constitution of the man; for he who has no feelings of kindness and consideration for the poor dumb animal that labors for him, would probably have as little feeling for one of his own kind in circumstances of distress.

Animals that furnish us food should not be overdriven and abused simply because they are destined soon to be killed. Men are accustomed to see many forms of cruelty, and think nothing of it, because it is so common. It seems to make no impression that chickens are taken to market tied together in bunches and suspended by the legs from the back of a hard-trotting horse. Such cruelty is indefensible. If it is necessary to bring them alive, they should be taken in coops. Poor, innocent calves and pigs are often securely tied by the legs in such a way as to destroy the circulation of the blood, and cause the parts to become intensely painful. In this manner they are often carried long distances and exposed to the extremes of heat and cold.

If any one has a doubt as to the humanity of this method of transportation, let him tie a string tightly around the base of his forefinger and let it remain half an hour. The ligature alone, without the jolting ride, will soon convince him that there might be more gentle methods of treatment. Such usage is not only a cruelty, but a serious injury to the flesh of the animal when prepared for market. It is said that the Hollanders always kill their fish when they take them from the water, because, when left to die by degrees in the air, the flesh is injured. Might we not add the argument of humanity as an additional reason why they should be quickly killed when taken from their own element?

When animals are to be killed for food, they should not be tortured or hurt. Not one pang of needless distress should be inflicted, but they should be dispatched in the speediest manner, and with the least pain. There is an element of barbarity in the torturing of any living thing, that is abhorrent to every kind and noble sentiment in our nature. Animals that are injurious to ourselves or our property may be destroyed, but it need never be done in a cruel or vindictive manner. They simply act in accordance with their nature, and although they may do us great injury, it is not because they have any sense of right or wrong; it is the operation of their instinct. To retaliate on a dumb and unreasoning brute, even a snake, by unnecessary cruelty in killing it, is inhuman and savage.

As all animals were made for the benefit of man, directly or indirectly, there is no wrong in hunting and killing such as are either useful for food or clothing, or are injurious to the crops or other animals in his employ. While it is entirely proper to kill those that are either useful for food or injurious, it is wrong to deprive any of life merely for sport. It is cruel to kill anything that breathes merely for the love of killing, and there can be no excuse or apology for it. It is pitiable to witness the spirit of wantonness frequently manifested by men and boys in the destruction of little singing birds, so pretty, so innocent, and, at the same time so valuable to the farmer and to the fruit-grower.

If such birds could be used for food, or if their feathers were valuable, or if any purpose were served that is economical, the outrage against nature would be pardonable. It is sometimes urged that such birds are injurious to vegetation, and that it is a matter of economy to destroy them. Were it not for the birds that frequent the gardens, and insects which prey upon each other, the number of destructive insects produced would be such as soon to overpower the industry of man, and put an end to his miserable existence.

By experiments made by Charles V. Riley, Ph. D., Chief of the United States Entomological Commission, in his report upon the usefulness of birds, showed that 20 old plovers would eat 3,000 insects each day, or 90,000 in a month. If these plovers had ten nests, which averaged four young ones each, and the young ones consumed 60 insects each per day, or 2,400 every 24 hours, or 72,000 per month, the 20 plovers and their progeny would consume 162,000 insects each month. At this same rate 1,000 plovers and their young would consume, in one month, 8,100,000 insects. That many locusts removed in one year from a farm of 160 acres would probably render it capable of producing crops even when these insects are doing their worst.

It has been computed that a pair of sparrows carried to their young in one week not less than three thousand three hundred caterpillars. Of 54 little victims whose crops were examined from the 18th of April to the 24th of May, 47 had eaten insects alone, and seven had their crops filled with grain and seeds. Of 46 old sparrows that were dissected at the same time, only three proved to be grain-eaters, while all the rest had been feasting on beetles and caterpillars.

These facts are not only in favor of the sparrows and plovers, but as much may be said for all kinds of these beautiful creatures. The little harm they do in taking fruit and grain is more than paid for by their incessant labor in ridding the fields and forests of injurious insects. But self-protection is not the motive that prompts their destruction; it is simply the satisfaction of trying to shoot them. If skill in using fire-arms is only achieved at such a sacrifice, it is not worth what it costs.

In this connection a plea may also be urged in behalf of the little birds' nests. As no profit can be derived from their destruction, it is a cruel invasion of the rights of the birds to disturb them. Every argument is in favor of the encouragement and protection of the birds; they are pretty, gentle, innocent and valuable.

As before stated, there can be no objection to the taking of wild game birds by the gun; but when poor, little domestic doves, the emblems of innocence and love, are sprung from a trap into the air in order to be shot for sport, there can be no excuse or palliation for the deed. Such sport is only worthy of unrefined, uncultivated, semi-civilized men.

Crupper, (croop'er), the rump of a horse; also the strap which extends along the back and around the base of the tail, in order to keep the saddle or the back-band from working forward, or to aid the check-rein in holding up the head. See Harness.

Cucumber. This is a tender annual plant, a native of the tropics, and very generally cultivated in the gardens of the United States. They require a warm location. For early cucumbers the seeds should be germinated under hand-glasses or gauze protectors. Plant after the ground has become warm, in hills four feet apart for smaller varieties, and five feet for the larger sorts. Manure with ashes, guano or well rotted compost, working the manure just under the surface. The usual stiff clay of the West should have a liberal proportion of sand worked into it. The frame cucumbers can be successfully raised in this country by giving them a well-sheltered location, plenty of manure, and hills six by six. As vermin and other accidents will destroy some of the plants, set out about twice the number sufficient to cover the ground, then thin the hills that may remain too strong. For pickling cucumbers the seeds are planted from June 15 to July 1, in the North. The vines will come in full bearing about the middle of August, and continue until frost.

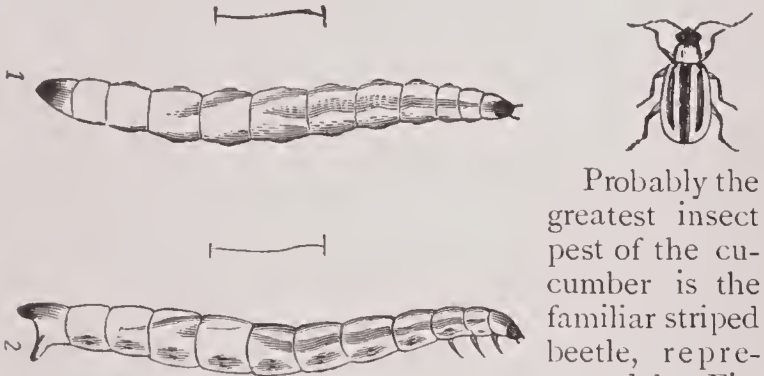


FIG. 1—*Striped Cucumber Beetle* (Galeruca vittata.)

Probably the greatest insect pest of the cucumber is the familiar striped beetle, represented by Fig. 1. The insects attack both roots and leaves. (See Insects). Among the older remedies recommended and either thoroughly or partially tried, we may mention the following: Treating the vines with a solution of Glauber salts, tobacco water, infusion of elder, walnut leaves, etc.; applications of ground plaster of Paris, powdered soot, sulphur, snuff, aloes, etc.; placing burning torches among the vines at night, etc. But at present there are but two remedial agencies which are considered worthy of trial. One is to cover the young vines with boxes open at the bottom and covered on the top with millinet or some kind of open gauze. The other is sprinkling the vines with Paris green and flour, or the Paris green solution as prescribed for the Colorado potato beetle. White hellebore is considered by many as equal to Paris green. Frequent dusting will chase and keep the bugs away. Or, young plants can be protected by a thin film of cotton batting fastened down with stones or earth, and when the plants grow too large for this, use London purple carefully.

VARIETIES. *Early Russian.* The earliest of all varieties; grows about four inches long.

Early Green Prolific. The most productive; fine for cutting up green as for pickles.

Early Frame. Short, early, prolific.

Long Green and *Short Green.* Old standard sorts.

Russian Netted. Hardiest of all; flesh white; skin covered with a pretty, brown network of a peculiar appearance.

Norbiton Giant. The longest and one of the most prolific.

Carter's Champion and *Sion House* yield but very few seed.

Marquis of Lorne. A celebrated Frame variety, short neck, smooth skin, and the fruit very straight and prolific.

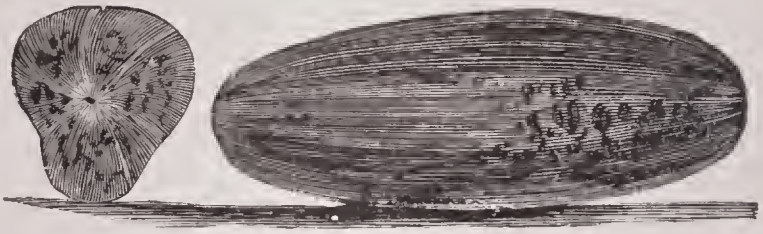


FIG. 2.—*Early Frame, or Table Cucumber.*

Boston Pickling and *Short Pickling* and *West India Gherkin* are the chief varieties for pickling; the latter is difficult to germinate; the Improved Long Green Prickly makes a hard, brittle pickle.

Many other varieties are advertised by seedmen, some of which are probably as good as those above mentioned. For a curiosity, the Snake cucumber, which grows six feet long and coiled like a snake, is extraordinary. See also Pickles.

Cud, that portion of food which is brought up into the mouth by ruminating animals from their first stomach, and chewed a second time, passing them into the third stomach to be fully digested into the fourth stomach; also, the inside of the mouth or throat of a beast that chews the cud.

Cultivation. Cultivation is that branch of agriculture which relates to causing increased growth, by means of implements for loosening the soil, thereby enabling the dew and rain to penetrate easily; and also in the destruction of weeds. This cultivation gives the soil proper aeration and enables the roots to easily penetrate the soil and readily assimilate proper nutriment. The motto, "plow deep," should not be carried out indiscriminately with all soils, for some, indeed, it may injure, by simply burying what little good soil there is on the surface. If the sub-soil is not very compact, there is no object to be gained by deep plowing. The only two objects in surface cultivation are the destruction of weeds and the pulverization of the ground, the latter to enable the soil to gather nutritious gases from the atmosphere. Heavy rains and a hot sun bake the surface, and at the first opportunity after every rain the surface should be broken up finely; and for this purpose a plank or roller, besides the use of the harrow or cultivator, is very important. The ground cannot be stirred too much when it is dry enough to pulverize well; when wet and pasty it should never be touched, except it may be necessary to go through and pull up weeds by hand. Fall plowing supersedes spring plowing, for most purposes. Whenever the ground is friable, it cannot be stirred too frequently during the early part of the season, or the earlier stage of the growth of the plant. Make the seed-bed firm, by harrowing, rolling, etc. See Farming, Rotation, Manure, Fertilizers, Harrow, Plow, etc., and the various plants.

Cultivator, as a farm implement, has come to mean, in the progress of improvement, an apparatus with a number of blades for stirring the soil. They are now supplied to the market in all imaginable shapes and styles, with or without seed-sowing attachments, handles, levers, riding-seats, etc., the simpler forms, on the one hand, approaching the double or treble shovel plow, and the larger, on the other, the harrow, gradually shading off both ways until they become one or the other. They are a great improvement over the old-time plow for superficial stirring of the soil. In no other branch of agricultural implements have there been more improvements made than in cultivators. The variety is so great that the farmer can now find a cultivator to loosen the soil around any product of his farm that needs cultivation. It would be impracticable, and well-nigh impossible to speak of all the different machines made to cultivate the soil. We do, however, give cuts of such as illustrate the general principles upon which all are based.

The principal features of the cultivator illustrated by Fig. 1. are the great height of the axle, and strength of the double-arched wrought-iron frame, cultivating the tallest corn with the least injury to the growing plant; advantage evener and whiffletrees lowered to the direct line of draft, relieving the horses' necks of all pressure; varied adjustability and improved safety pin; steel couplings, which give the freest lateral and vertical motion of the beams—more durable and less liable to break than any other; single tongue, affording greater facility in turning. Shields are furnished with each cultivator. Its single-trees are adjustable to direct line of draft. It is essentially a wrought-iron machine. A fifth shovel is attachable for putting in small grain; it is made with wood or iron beams.

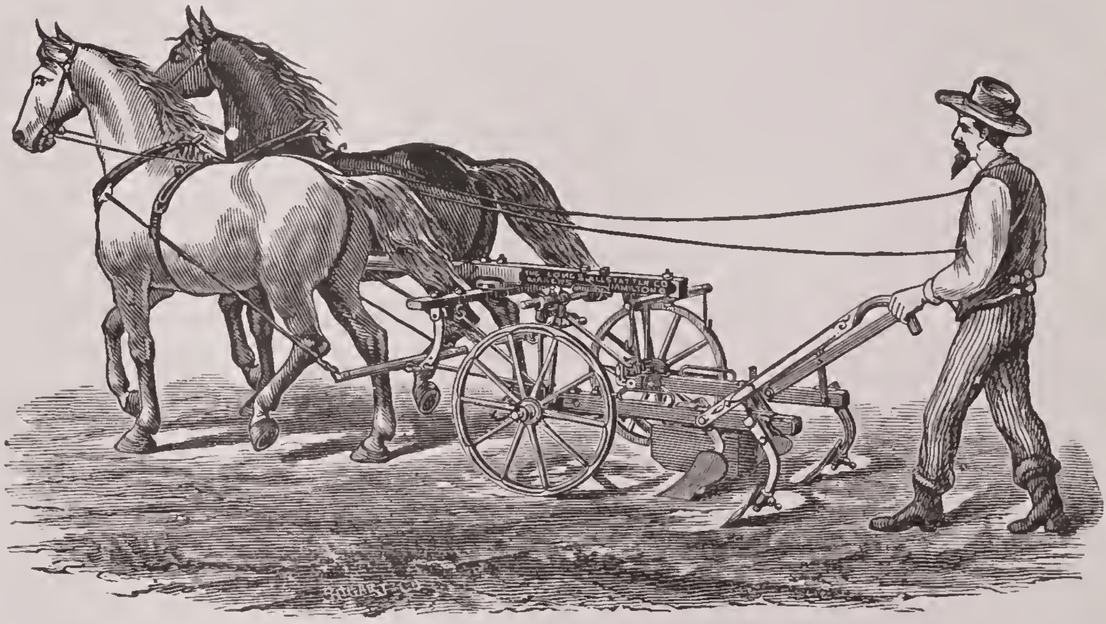


Fig. 4.—*Adjustable-Arch Barshare Cultivator.*

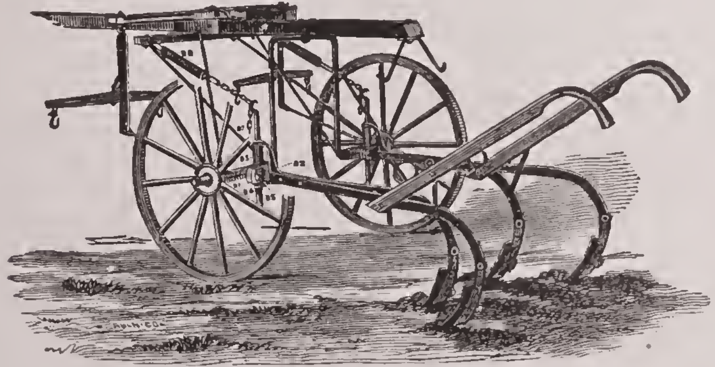


Fig. 1.—*A Walking Cultivator.*

All cultivators are made either with or without gauge wheels on the fore end of the beam, and with blades of all styles.

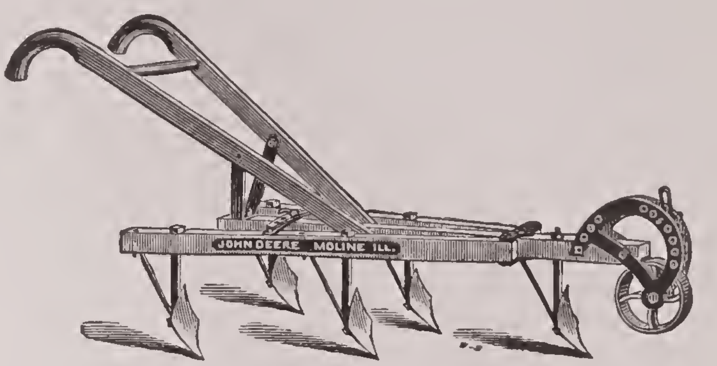

JOHN DEERE MOLINE ILL.

Fig. 2.—*Five-Tooth Cultivator.*

Fig. 3 illustrates a tongueless cultivator, for which the following advantages are claimed:

1. Runners do not conform to every inequality of the ground, and therefore are steadier, giving no wabbling motion as wheels do, which is a serious objection to wheel tongueless. 2. It has no jointed arch nor complicated castor wheels, and is not liable to become tangled in turning or to upset on hillsides. 3. When the shovel rigs are suspended by the hooks for moving about from field to field, or in turning, they are nicely balanced, and need no additional runners for such transportation, as is the

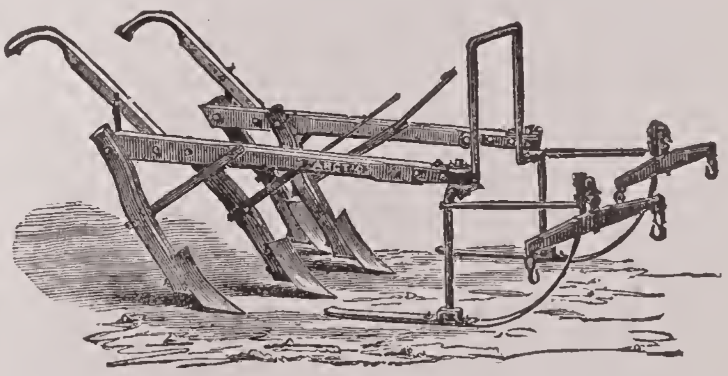


Fig. 3.—*Tongueless Cultivator.*

case with wheeled machines. 4. In moving down a slight incline or hill, when so suspended, they do not slide forward on the horses' heels, as is the case with wheeled tongueless machines, and which sometimes occasions serious trouble.

The three cultivators above illustrated are made by Deere & Co., of Moline, Ill.

For the kind illustrated by Fig. 4, manufactured by the Long & Allstatter Company, Hamilton, O., it is claimed that it enables the farmer to plow closer to the young corn than with ordinary shovel, or "bull-tongue" plow; to get into his corn a week or ten days earlier in wet seasons; to open such furrows as will permit the air and sunshine to enter and warm the soil; to run steady and do good work in the toughest or hardest soil. The bar-shares, moreover, can be reversed, to "lay the corn by," and when used in combination with shovels, either level culture or an open furrow can be left as desired.

The "Deere Riding" cultivator, represented by Fig. 5, is a fine sample of the riding cultivator. The spring which connects the shovel rigs is flexible and allows them to be spread apart by the plowman, and has power to draw the shovels back into position, when dodging crooked hills, relieving the plowman of much hard work and insuring more thorough cultivation. Seat slides back or forward to accommodate weight of driver. Shovel rigs are held upright and the desired distance apart by cross bar and spring attached to upright standards. Width between shovel gangs is readily adjusted by cross bar and spring, without stopping the team. By means of levers working in ratchets the depth of shovels can be instantly changed while the team is in motion, and each side can be changed independently. By means of the treadles with spring attachment the shovels are easily raised clear of the ground, for turning at the ends, or for clearing the shovels of trash.

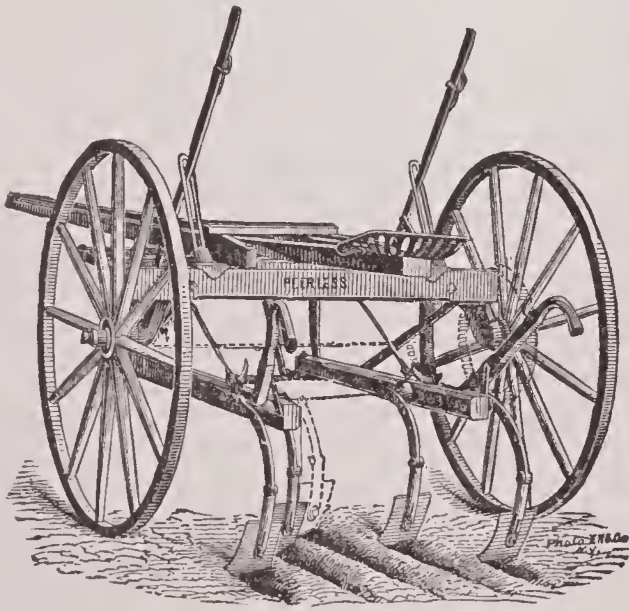


FIG. 5.—*A Riding Cultivator.*

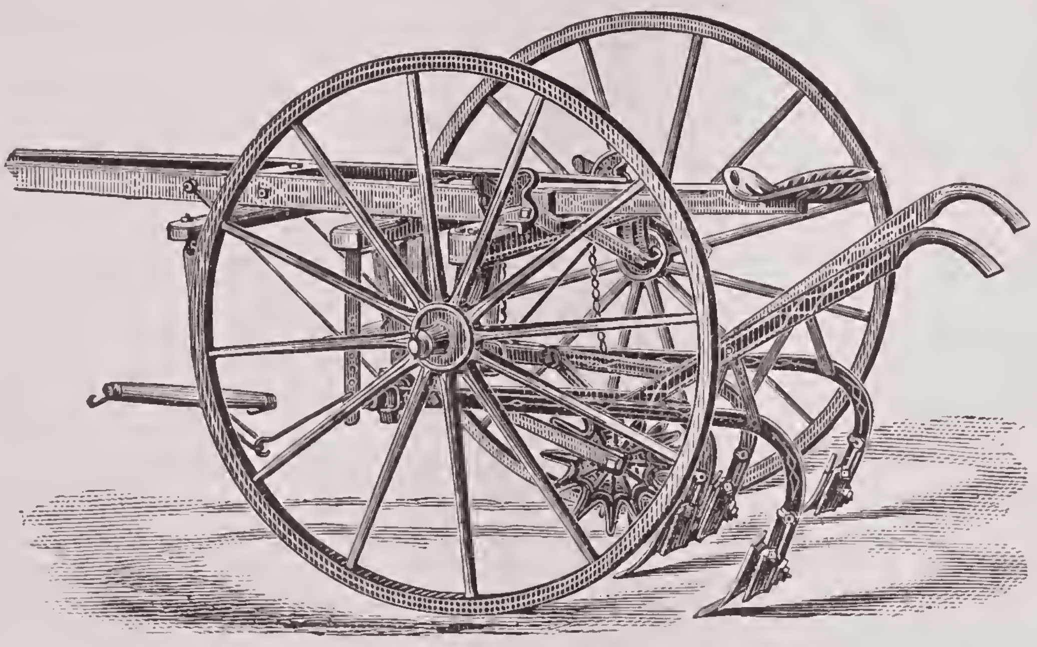


FIG. 6.—*Cultivator, with Rotary Shields and Treadles.*

Fig. 6 represents the "New Junior" cultivator, with iron or wooden beams, four shovels, rotary shields and treadles, as manufactured by P. P. Mast & Co., Springfield, O. It has a force-feed seeding attachment, which combines all the advantages of a corn cultivator, a fallow or field cultivator, and a broadcast seeder. The quantity sown is regulated without any change of gears, simply by moving the indicator on the dial on the rear of the hopper, in plain view of the operator, and can be varied as much or little as the size or condition of the grain may demand. Cultivators of this style are adapted to either walking or riding, and the seed-sowing attachment is adapted to any kind of grain, including even flax seed.

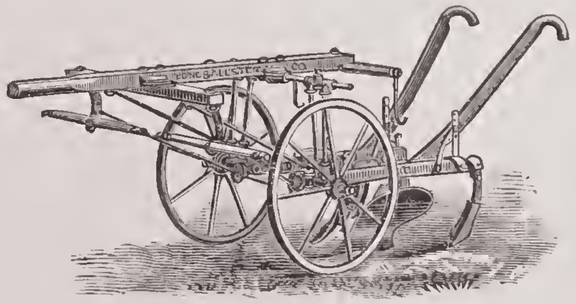

LONG & ALLSTATTER CO.

FIG. 7.—*Cultivator.*

Fig. 7 is the cut of a nice cultivator manufactured by the Long & Allstatter Co., which can be used with or without extra blades, according to the nature of the crop, and can be adjusted for either shallow or deep plowing.

At this day of progress in the world of gardening, it is simply foolish for one to scrape over vast surface of soil with the tedious hoe, when with a cheap "cultivator," either drawn by horse or run by hand, he can just as well go over five to ten times as much ground. The hoe is to be used only in those close quarters which cannot be reached by a machine. It is economical, therefore, to plant in rows as far as practicable, with the view of using the cultivator. Fig. 9 is an engraving of one of the best, the Matthews. It is said that with one of these a man can do about six times as much as he could with a hoe. A drill and cultivator combined (Fig. 10) is also a great convenience for gardeners. The cut shows the cultivator attachment removed. The machine works in either capacity, or in both at once. The seeding apparatus is capable of sowing nearly all kinds of seed. The last two implements are manufactured by Everett & Small, Boston, Mass.

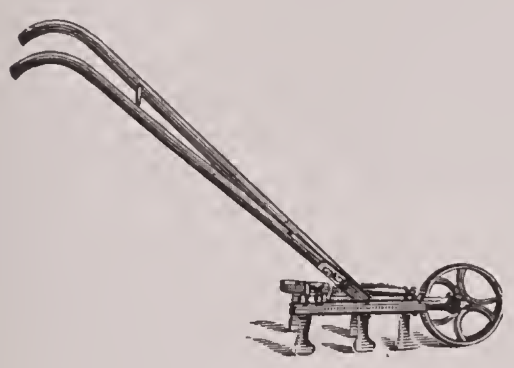


FIG. 9.—*Hand Cultivator.*

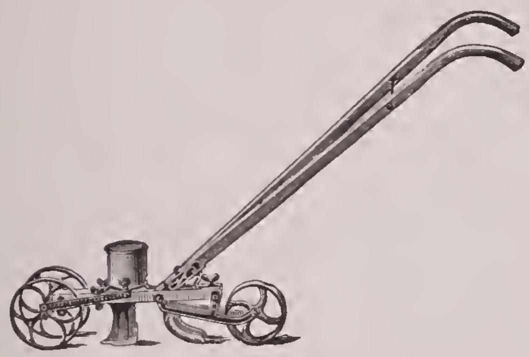


FIG. 10.—*Drill and Cultivator Combined.*

Cupboard. The most important thing to say concerning this essential article of kitchen furniture, is that extraordinary pains are required to keep it free from foul odors. Victuals of all kinds, when cold, absorb deleterious gases from the air. Butter is particularly "sensitive" to such exposure, and when kept in a cupboard, soon begins to lose flavor, and the family suspects that it is the nature of the butter to deteriorate under any circumstances, when, if kept in the right place—in pure cold air—it would keep sweet and well flavored a long time. The next observation, in practical importance, is perhaps the situation of the cupboard. While the victual cupboard should be in a cool, clean place, the dish cupboard, containing all the conveniences of cooking, should be near the range or cooking stove.

Curculio: see Plum.

Currant. This is one of the most valuable of all small fruits, as it can be used to such advantage in a variety of ways, whether in a green or ripe state, and is so easily grown. It is indispensable in every small garden. When green it is used in pies, tarts, etc., stewed like gooseberries. When ripe, it is much used as a table fruit, with plenty of sugar; but it is almost universally used in a jelly that is both delicious and wholesome. It also makes an excellent wine, at a cost of not more than two or three dimes per gallon. The black currant is chiefly used in a jam or jelly. Currants ripen in midsummer, and if protected from the sun will remain on the bushes until October. A free use of this fruit is exceedingly healthful. Very fine summer drinks are made of the currant, it being a good substitute for the lemon. The expressed juice, diluted with water, sweetened, and flavored with vanilla, makes a beverage for hot weather about equal to lemonade, and is even preferred to the latter by some people.

CULTIVATION. Nothing is easier of culture. Cuttings about a foot long, of well-ripened wood of the month of October, are set in moist, rich soil, and nothing more is generally required except manuring and mulching; indeed, the currant can stand more of this than any other plant that is cultivated. Cut square across just below a bud, if to be grown in standard form, and cut out all the eyes except two or three of the upper ones; if in bush form, which generally is preferable, this may be omitted. All sorts of refuse from the kitchen, cellar, stables and privy vaults are in order in the currant garden. Better fruit, however, can be produced by preventing the growth of suckers, by shortening the most vigorous branches, and by keeping the bushes well shaded. Some recommend keeping the bush in the form of a little tree. Of course a good horticulturist will have pride in pruning out all the defective canes and keeping the bushes neat in appearance. The old bushes in six or eight years begin to decline, and it is not remunerative to expend any labor upon them. They should be replaced with new plants.

While the currant is not subject to any disease, there are two or three insects which do it some damage. By far the greatest amount of mischief is done by the famous currant borer, which has not yet appeared in some sections of the West. White hellebore, in the form of powder, is an effectual remedy, but as some persons fear that it is too poisonous to be used in such close connection with an article of diet, the next best thing is to cut off the infested parts, about May 20, and burn them; or sprinkle powdered carbolate of lime over the bushes two or three times; or dilute carbolic acid (one per cent.); or coal oil and soap suds. If this work is done earlier the diseased parts cannot be discriminated; if later, some of the worms might escape. Sometimes the currant is infested with a species of louse, for which no efficient remedy is offered.

VARIETIES. *Black English.*—This currant, which is scarcely distinguishable from the Black Naples, is by some considered equal to it in value, and by some quite inferior; probably depending upon differences of taste, or soil, or of cultivation.

Black Naples. This is a beautiful fruit, and is the finest and largest of all the black currants, often measuring nearly three-fourths of an inch in diameter. Its leaves and blossoms appear earlier than those of the English, but the fruit is later, and the clusters as well as the berries are larger and more numerous.

The two foregoing varieties are all of the black currants recommended for Western cultivation.

Attractor. Berry large, in a rather short bunch, sweet and good; leaf peculiarly narrow and toothed.

Cherry. This is the largest of all the red currants; is a moderate bearer, but strong grower; leaves thick, dark green; fruit dark red, quite acid; clusters short. The bushes hold their foliage well and this is one of the best varieties for late use.

The *Long-Bunched Holland*, or *Long-Bunched Red*, is becoming a popular variety in the West. The berries are large, deep red, the bunches long, the clusters a little larger than those of the Red Dutch, and the plant is very productive. The fruit will hold on until frost. It also stands the heat of our climate better than the Red Dutch; is not preyed upon by insects, but is rather difficult to propagate by cuttings; the best way is to make stools or mound up among the plants so they will take root.

Red Dutch. This is by far the most popular currant in this country, and everybody is acquainted with it. The plant is hardy, easy of cultivation, and the fruit when well ripened is not so sour as some other kinds.

Versailles, Fertile D'Angers. This currant is a very vigorous grower, with large, coarse foliage, and productive. Fruit is next in size to the Cherry currant, is very beautiful and superior to it in agreeable flavor. It is highly recommended by Western horticulturists.

Victoria, May's Victoria, Houghton Castle, etc. A late variety, with large and very long bunches of bright red, acid fruit. The plant is vigorous, is a moderate bearer, and the fruit hangs on the bushes some two weeks longer than most currants. The bunches are rather longer than those of the Red Dutch and the berries a brighter red.

White Dutch. This variety has several other names in other parts of the world, but is known only by this name in the Western States. It is precisely similar to the Red Dutch in habit, but the fruit is larger, with rather shorter bunches, of a fine yellowish-white color and a very transparent skin. It is considerably less acid than the red currants and therefore preferred to them for table use; by many it is considered the best currant for home consumption. It is also a few days earlier than the Red Dutch; plant very productive.

White Grape. Berries very large, whitish yellow, sweet and good; bunches moderately long; branches more horizontal than White Dutch; less vigorous, but very productive.

White Provence. Good habit of bush; leaves usually, but not always, edged with white or yellow; fruit large and handsome.

For ornamental varieties of the currant, see Ornamental Trees; to can currants, see Canning.

CURRANTS, TO DRY WITH SUGAR. Take fully ripe currants, stemmed, 5 pounds; sugar, 1 pound; put into a brass kettle, stirring at first; then as the currants boil up to the top, skim them off; boil down the juicy syrup until quite thick and pour it over the currants, mixing well; then place on suitable dishes, and dry them by placing in a low box over which you can place musquito-bars to keep away flies. When properly dried, put in jars, and the paper over them. To prepare them for the table, put cold water upon them and stew as other fruit for eating or pie-making, adding more sugar if desired.

Currant Sherbet. Take the expressed juice of fresh, ripe currants, dilute in four times its quantity of water, and flavor with vanilla. An excellent summer drink, equal to lemonade.

Current, now passing or in vogue. "Account Current," or "Statement" of account, is an account of credits and debits since the last settlement. "Price Current," a published list of the market value of articles in a given line. "Current year," "current month," etc., the present passing year, month, etc.

Curtain: see Window. To renovate lace curtains, see Laundry.

Curry, a stew of fowl, fish, etc., cooked with curry sauce, which is made of pepper and other strong spices.

Custard, eggs and milk cooked together. In making custards always avoid stale eggs. The whites should be beaten separately and put in the last thing. Never put eggs in very hot milk, as it will poach them. Always boil custards in a vessel set in boiling water.

APPLE CUSTARD. Pare, quarter, and core 6 mellow, tart apples; set them, with 6 spoonfuls of water, in a pan, on a few coals; and as they soften, turn them into a pudding-dish, and sprinkle on sugar. Mix 8 eggs, beaten with rolled brown sugar, with 3 pints of milk; grate in half a nutmeg, and turn the whole over the apples. Bake about twenty-five minutes.

BOILED CUSTARD. Boil a quart of milk with a little cinnamon and half a lemon-peel; sweeten it with nice, white sugar; strain it; and when a little cooled, mix in gradually 7 well-beaten eggs, and a tablespoonful of rosewater; stir all together over a slow fire till it is of proper thickness, and then pour it into glasses. This makes a good boiled custard.

COMMON CUSTARD. Boil a pint of milk with a bit of cinnamon and lemon-peel; mix 1 tablespoonful of potato flour with 2 of cold milk; put in a sieve, and pour the boiling milk upon it; let it run in a basin; mix in by degrees the well-beaten yelks of 3 eggs. Sweeten and stir it over the fire a few minutes to thicken.

CREAM CUSTARD. Beat 8 eggs and put into 2 quarts of cream; sweeten to the taste; flavor with nutmeg and cinnamon.

Custards to Turn Out. Mix with the well-beaten yelks of 4 eggs a pint of new milk; half an ounce of dissolved isinglass; sweeten with loaf sugar, and stir it over a slow fire till it thickens; pour it into a basin, and stir it till a little cool; then pour it in cups to turn out when cold. Add spice as you like to the beaten eggs.

Ice-Cream, or Frozen Custard. Take 10 eggs, the whites for the cake beaten to a stiff froth; 1 tumbler of sugar; 1 tumbler of flour, not quite as full; 1 teaspoonful of cream of tartar or baking-powder (no soda); flavor, stir together carefully, and bake. Previously have a pan two-thirds full of new milk over a kettle of boiling water for the custard. Put into the milk 2 cups of sugar, beat the yolks of the eggs with 2 tablespoonfuls of corn starch, and stir into the milk when at a boiling-point two minutes; strain through a sieve; when cool flavor and freeze.

Lemon Custard. Take half a pound of loaf sugar, the juice of 2 lemons, the peel of 1 pared very thin, boiled tender and rubbed through a sieve, and a pint of white wine. Let all boil for a quarter of an hour, then take out the peel and a little of the liquor and set them to cool. Pour the rest into the dish you intend for it. Beat the yolks of the eggs and the whites, and mix them with the cool liquor. Strain them into a dish, stir them well up together, and set them on a slow fire in boiling water. When done, grate the peel of a lemon on the top, and brown it over with a salamander. The custard may be eaten hot or cold.

Rice Custard. Mix a pint of milk, half a pint of cream, an ounce of sifted ground rice, 2 tablespoonfuls of rose water; sweeten with loaf sugar, and stir all well together till it nearly boils; add the well-beaten yelks of 3 eggs. Stir and let it simmer for about a minute; pour it into a dish, or serve it in cups, with sifted loaf sugar and a little nutmeg over the top.

Cuticle (cu′ti-cl), the external or scarf skin, which protects the more vital, true skin. It gradually scales and wears off and is constantly renewed, like the hair and nails.

Cutter-Bar, the cutting apparatus of a mowing or reaping machine; also the coulter of a plow.

Cuttings of cions for grafting, as well as for simple insertion in the ground, are best made during the winter season, but not when frozen, or in the late fall or very early spring, when the vital forces are most at rest. Until they are used they can be preserved in moist sand or earth in the cellar at a temperature next to freezing. The grafts, after they are made, may be preserved in a similar manner. A good way of preserving grape cuttings, and also some other kinds, is to pack them vertically in a box of moist sand or earth, let the surface freeze, and then put them away in a place where they will not thaw out until spring.

Grape cuttings should contain two or three buds, according to the method adopted for cultivation or nature of the variety, and gooseberry and currant cuttings should be about eight inches in length and from the strongest shoots of the present year's growth. They should be of the best and ripest wood. Many prefer, with most plants, what is called "mallet-cutting," which is the taking of a small portion of the old wood in addition, forming a mallet-shaped cion. In this case a greater amount of stored-up vitality is kept with the cion, to aid in giving it a start. See also Grafting, and the various fruits.

Cut-Worm. See Insects, and respective vegetables, fruit-trees, Corn, etc.

Cypress, the name of several species of trees flourishing in the Southern States. The cypress vine is a beautiful climbing plant of the morning-glory family, hardy in the North.

D

DAIRY, the place, room or house where milk is kept and converted into butter and cheese. The operations of the dairy have been fully described under the heads of "Cream," "Cheese," "Butter" and "Milk." Here the dairy will be treated simply as the place where these operations are performed. Should they in any case not be extensive enough to warrant the erection of separate buildings, the principles and rules laid down here will, with due qualification, be perfectly applicable. Where they are prosecuted in anything approaching a large scale, a separate building is indispensable. The dairy requires, proportionally, just as many conveniences as any other manufactory.

The site of the dairy-house will necessarily depend both on the nature of the locality and the convenience of those managing it. It should not be too far from the house, nor too near the cow-house. If possible, it should be constructed over a spring of running water, which is the great essential in every dairy, or in the near vicinity of a well or spring worked by a windmill by which a constant flow of pure, cold water can be secured. It is needless to state that the building should be at a convenient distance from the milking-sheds of the farm, the feeding-troughs of the cows or the piggery, and equally handy for feeding the whey to the cows or pigs as it may be at any time determined upon, and to which it may be run by spouts from the dairy room. The building should be so placed as to be screened from the sun's rays, and the building so constructed as to prevent, as far as possible, the external temperature from affecting that of the dairy-rooms. The ice-house should be immediately contiguous to the dairy-house, for obvious reasons. The house should have a cellar, and water should be so convenient as to be easily drawn or pumped into the vats used for running up the curd or for washing the dairy utensils. The walls may be of any convenient material. Where brick is cheap and easily obtainable, the walls are sometimes built double or hollow in the interior. These effectually prevent the passage of heat. Such construction is, however, more necessary for the milk-room than elsewhere. In case the building has to be of wood, the sides may be made double and the intervening space filled with sawdust or any other non-conducting substance. Strong, thick slates, with lath and plaster below, are sometimes used, but the expense is heavy. Proper drains should be made for carrying off the water. The floors of ordinary dairies are usually paved with brick or tile, but it is difficult to recommend either, for they are neither level nor closely jointed enough to prevent the spilled milk from lodging in them and creating an unpleasant odor exceedingly damaging to the milk, and, consequently, to the butter and cheese. Brick and tile absorb much wet, too, and are slow in drying, producing in winter a chill which gives rise to dampness and mouldiness. Good-sized paving stones are, in every respect, preferable; slate, where procurable, may be advantageously used for the purpose. The best form is three feet square by one-half inch thick. They should be laid in mortar, or which is much better, a bed of concrete four inches thick should be laid under the mortar. The floor of the cellar should have a fall to a trap in the corner leading into the drain. Experiments have shown that slate absorbs only one two-hundredth part of its weight in water, and exposed to a temperature of 60°, dries in about one-fourth of an hour; while tile absorbs about one-seventh of its weight, and under similar conditions, does not dry perfectly in less than seven days.

Deep excavations in the earth constitute good conservatories, as the temperature is uniformly right and the earth walls are the best deodorizers. (See Ice-house).

For an ornamented dairy, Minton tiles may be used. The sides of the interior should be plastered or stuccoed. The windows should be double, but made to open with lattices covered with wire-gauze, to keep out the flies, with double wooden shutters to guard against severe cold in winter. The shelves may be made of flag-stone, marble, or wood covered with lead or slate. The latter is the best material. A large table in the center of the room will be found useful. Ventilation will be best obtained by a funnel running through an aperture in the roof. A complete dairy should consist of several rooms, according as butter only, or both butter and cheese are to be made. There should be a separate room for the milk while it is throwing up the cream, a room to serve as a dairy scullery, and a third for churning. Cheese may perhaps be made in this last; but, if there is much of it, a fourth room should be devoted to this purpose.

Winter dairying will become a very important industry if the proposed system of ensilage should prove to be a success. See Ensilage.

Dam, a wall or embankment across a stream, restraining the current; the mother—said of domestic four-footed animals.

Damask, a kind of stuff with raised figures in various patterns, as flowers, etc., woven in the loom. It is made of silk intermingled with flax, cotton or wool. Imitation damask is made of linen.

Dandelion, a genus of hardy, perennial-rooted herbaceous plants. It is a very common and exceedingly well known weed of meadows, pastures and road sides. It is diuretic, tonic, and aperient, and has a direct action in removing obstructions of the liver, kidneys and other viscera. It is peculiarly valuable in all liver complaints, derangement of the digestive organs, and in dropsical affections. Were this plant not so common and so cheap, it would be prized like gold! An infusion or decoction may be made of the roots or leaves. But the extract is the best, thus prepared: Take up the roots in September, clean them, bruise in a mortar, and press out the juice; strain and put it upon a plate in a warm room to evaporate, and render it thick and solid. Dose, from a scruple to a drachm three times a day.

Dandelion Beer. Dandelion root, ½ pound to 1 gallon of water; boil well and when cooled add 1 pound sugar, 1 ounce ginger, a lemon, and 1 ounce cream of tartar. Add a little yeast. It is very good for the liver and digestion.

Dandelion Coffee. Good coffee, 3 parts; hard extract of dandelion, 1 part; chickory, 1 part. Reduce them to a coarse powder, and mix and grind them together. Good for the digestion and affections of the liver.

The young leaves of the plant are much used in early spring as "greens" or a salad, when other fresh grown herbs are exceedingly scarce and greatly wanted.

Dandruff, branny scales from a morbid skin, especially of the scalp. To free the head from dandruff it should be well stimulated night and morning by means of a strong hair-brush, and the free use of a small-toothed comb. A lotion of 2 drachms of borax, dissolved in a pint of rosemary water may be applied three times a week. Glycerine and rose-water are also prescribed. Should this fail to cure the evil, an ointment composed of 1 ounce of white cerate mixed with ½ a drachm of creasote, is to be rubbed into the roots of the hair every night for a week, at the expiration of which time the person should have the head thoroughly washed with soap and water, take a hot bath, bathe the head with the rosemary and borax, and with a clean brush the next day remove any exfoliation which may have been thrown out.

Many decoctions of herbs and roots have been prescribed. A solution of sulphur with the sulphide of potassium is also recommended; but no violent drug should be permitted to remain on the skin but a moment. Probably the virtue of all the remedies prescribed in the world for this trouble is due to washing and friction. Try soft cold water and rubbing twice a day, and keep up the habit several times a week, all your life.

Dashboard, a board placed on the fore part of a carriage, sleigh or other vehicle, to ward off water, mud and snow. See Carriage, page 163.

Date Plum, the persimmon; more strictly, the fruit of a foreign species of persimmon.

Dates, the fruit of the date-palm tree, sweet, palatable and nutritious. They are often employed in cookery, as raisins are, and are sometimes stewed separately. The cheapest in the market are generally too dirty for use. The best are large, softish, not much wrinkled, of a reddish-yellow color on the outside, and with a whitish membrane between the flesh and the stone.

Day Book, a book in which are recorded the pecuniary transactions of the day, in the order of their occurrence. See Book-keeping.

Days of Grace, the three days allowed by law to a debtor after his obligation becomes due, in which to pay the debt.

Dead Center, in machinery, either one of the two opposite points in the orbit of a crank, which are in line with the piston rod, and where the power has no bearing in propelling the machinery. Those in charge of a heavy engine generally avoid stopping the machinery with the connecting rod "on the dead center," as in such a case it is difficult to start again. Locomotive engines are always double, one working at right angles with the other and thus mutually aiding in passing the dead center.

Dead Heat, a heat or course between two or more race horses, in which all come out exactly equal, no one winning.

Dead Set, the fixed position of a pointer dog in indicating game.

Dead Shot, an unerring marksman.

Dead Wall, a solid wall with no doors, windows or other openings.

Deafness. This troublesome complaint is not uncommon. It may be due to any one of the following causes: 1. Too much wax in the ear; 2. a common cold; 3. scarlet fever; 4. gout, etc. To remove the accumulation of wax inject warm water with a syringe. Avoid picking and poking at the ears. A little oil dropped into the ear helps to dissolve the wax. Deafness arising from cold will be removed by the cure of the cold. In scarlet fever, deafness arises from the connection which exists between the throat and the ear. For ordinary cases of deafness either of the following remedies may be resorted to: Drop three or four drops of glycerine in the ear before retiring at night; in the morning syringe the ear with warm water, and continue this practice faithfully for some time; or, take pure olive oil say 1 ounce, and ½ ounce each of tincture of lobelia and tincture of cayenne; mix, and, from a warm teaspoon, drop into the ear four to six drops of this twice a day, shaking the vial well before using it. This is relaxing, softening and stimulating, and in all ordinary cases will answer the purpose. Turkey oil (or grease) is said to be still better than olive oil, and may be used instead of it in this preparation; or, take a common eel, remove the skin and intestines, hang it before the fire, and let the oil drip into a pan or vessel; when done dripping bottle the oil, and of this drop into the ear once or twice a day five or six drops from a warm teaspoon.

Death, Apparent. In this connection we treat of apparent death from hanging, intoxication, lightning, etc., while under the head of Drowning and Freezing we very fully treat of apparent death by drowning and freezing.

From Hanging. In addition to the means recommended for the apparently drowned, bleeding, to relieve the pressure of blood on the heart and lungs should early be employed by a medical assistant.

From Noxious Vapors, Lightning, etc. Remove the body into cold, fresh air. Dash cold water on the neck, face and breast frequently. If the body be cold apply warmth, as recommended for the apparently drowned. Use the means for inflating the lungs as directed above. Let electricity (particularly in accidents from lightning) be early employed by a medical assistant.

From Intoxication. Lay the body on a bed, with the head raised; remove the neckcloth and loosen the clothes. Obtain, instantly, medical assistance; in the meantime apply cloths soaked in cold water to the head, and bottles of hot water, or hot bricks, to the calves of the legs and to the feet.

On restoration to life, a tea-spoon of warm water should be given, and then, if the power of swallowing be returned, small quantities of weak brandy and water, warm; the patient should be kept in bed, and a disposition to sleep encouraged, except in cases of apoplexy and intoxication. Great care is requisite to maintain the restored vital actions, and to prevent undue excitement. The treatment is to be persevered in for three or four hours.

Death Watch, a small beetle sometimes heard making a clicking noise in the wall or book-case resembling the ticking of a watch; supposed by some superstitious people to forebode death in the family. See page 100.

Debit (deb'it), a recorded item of debt; to charge with debt.

Decanter (de-can'ter), a vessel from which fluids are poured out gently to leave the sediment behind.

Deciduous (de-sid'u-us), not evergreen.

Decoction, a tea; the virtues of any vegetable matter boiled out into water. An "infusion" consists of the virtues of a substance soaked out in cold water; a "tincture," the virtues drawn by and into alcohol or whisky; an "extract," anything drawn out by heat, distillation, spirits or other chemical process.

Dedication is the granting to the public, for use, any land for roads, churches, schools, cemeteries, etc., by the owner, with intent that it shall be used as designated. It must be accepted by the public. The grant may be direct by deed, or implied from acts. Acceptance is by direct acceptance or by occupancy and use. A constant use by the public for twenty years, with knowledge of the owner, will be, in most States, sufficient to presume dedication. Land dedicated for one purpose cannot be used for another, except by consent of the original owner.

Deed, a sealed instrument in writing, duly executed and delivered, containing some transfer, bargain or contract. In former times any writing signed and sealed was termed a deed; now the law confines the meaning to instruments for the sale of land. In this country no land can be transferred excepting by a deed, which must be properly signed, sealed, witnessed, acknowledged, delivered, and recorded. In some of the States, seals are not necessary to the validity of a deed. A deed should be written or printed on parchment, as paper is more perishable in character. The person making the deed is called the grantor; the person in whose favor the deed is made is called the grantee. The deed should be signed by the grantor with his full name, written clearly in ink of the best quality. A person accepting a deed signed with a lead pencil places his rights in jeopardy. If the grantor cannot write his name, he may make his mark. The name of the grantee should be written clearly, with good ink, in the proper place in the deed.

In the States which require a seal great care must be given to see that only those recognized in law are used. Strictly speaking, a seal is a piece of paper wafered on, or a piece of sealing-wax pressed on the paper. In the New England States and in New York, the law does not acknowledge any other kind. In the Southern and Western States, the written word "Seal," with a scrawl around it, placed after the signature, constitutes a legal seal.

A deed must be delivered in order to render it valid. There is no special form necessary to constitute a proper delivery. If the deed comes into the possession of the grantee with the knowledge and consent of the grantor, however it may have been gotten possession of, it is a valid delivery. If a man makes a deed and fails to deliver it, and dies with it in his possession, the deed is of no effect whatever. A deed to a married woman may be delivered either to her or her husband.

Some of the States require that deeds shall be attested by two witnesses. New York requires but one. Other States do not require any witnesses; but in all cases a deed ought to be witnessed by at least two persons, whether the law requires it or not. It is best to have adult witnesses; but minors may act in this capacity if they be of sound mind. The witness must have no interest in the deed. For this reason a wife cannot witness her husband's signature.

As a general rule, deeds are valid between parties even when not acknowledged. It is always best to have them acknowledged, however, as an unacknowledged deed cannot be recorded. The acknowledgment must be made before a person authorized by the law to receive it. In some places a deed may be acknowledged by either of the grantors, but the old custom of an acknowledgment by all the grantors is the safest as well as the most general. Where a wife joins with her husband in conveying away their land, or does it separately, a particular form and mode of acknowledgment is generally required to show that she acted without undue influence from him, and of her own free will. It is the duty of the justice taking the acknowledgment to state in his certificate exactly how it was made before him.

A deed must be recorded to be valid, that is, the grantee must deliver it to the recorder of deeds, or other officials appointed by law for that purpose, who must cause it to be copied in full in a book kept in his office for that purpose. A deed is regarded as recorded from the moment it is placed in the hands of this officer, and he generally writes upon it the year, month, day, hour, and minute when he received it. Deeds should be presented for record at the earliest possible moment. Sometimes the ownership to land conveyed may depend upon the exact minute at which the deed was delivered for record. This system of recording deeds enables a person to trace the title to property with absolute certainty.

When a deed is filed for record it is notice to all the world, and if the recorder make a mistake in recording or indexing, it will not affect the title of the grantee. He has complied with the law in filing it for record, and is not affected by subsequent mistakes of officers.

All erasures or additions to a deed should be noted at the end of it, and properly witnessed. Any such changes without being thus provided for renders the deed null and void.

In order to make a valid deed, the grantor must be true and lawful owner of the property; must be of legal age; and must be of sound mind.

A deed to a FARM includes, in addition to the land and growing timber, fences and rails or lumber laid out along a line for a fence. Boards piled up on the farm all in bulk, although intended for fencing, do not pass. Loose boards in barns, out-houses etc., do not pass with the deed, but are personal property. Growing crops usually pass when they belong to the owner, unless especially reserved; also, all buildings, and lumber which has been in a building or crib, even if torn down and laid away for future use. A furnace set in brick, either in the house or outside, passes, and everything that is so attached to the buildings as to mar them by removal. Pumps, water pipes, and iron kettles set in brick work, and a large bell attached to any of the buildings or on a post set in the ground all pass.

When a deed is filed for record it is notice to all the world, and if the recorder make a mistake in recording or indexing, it will not affect the title of the grantee; he has complied with the law in filing it for record and is not affected by subsequent mistakes of officers.

Deeds, To Make Legible. To make the writing in deeds legible, when sunk or obliterated, take five or six galls, bruise them and put them into a pint of strong white wine; let it stand in the sun two days; then dip a brush into the wine and wash the part of the writing which is sunk or faded, and by the color you will see whether the wine has enough of the galls. The writing fades because the gallic and tannic acids contained in the ink perishes, through age, but the iron still remains. When, therefore, the fresh gallic and tannic acids are re-supplied, the ink again becomes black.

Delirium Tremens (de-lir′ i-um tre′ mens), a fitful brain disease of drunkards, victims of opium and other narcotics, wherein the patient imagines that snakes, demons, etc., are about him. The principal reliance in the treatment of this terrible and peculiar disease is in opium and brandy, or narcotics with alcoholic stimulants. Induce regular sleep by first taking an emetic and an enema, a shower bath, and then every three hours 15 to 18 grains of ipecacuanha. Nicely made broths and gruels should be his diet. Or give sulphate of quinine, 12 grains; sulphate of morphine, 1 grain; mix, and divide into 6 powders. Dose, 1 powder every hour. Also, a preparation of cinchona is popular, for this purpose, at the present.

Demijohn (dem′ i-jon), a glass vessel or bottle with a large body and small neck, enclosed in wicker-work.

Deodorizers: see Disinfectants.

Demulcent, a bland or mucilaginous medicine which protects raw internal surfaces from exposure.

Depilatories (de-pi′la-to-riz), substances used for eradicating the hair. The safest depilatory is a strong solution of sulphuret of barium made into a paste with powdered starch; apply immediately after being mixed and allow to remain from five to ten minutes.

Brudet's Depilatory: Mix 3 parts hydro-sulphuret of sodium, 10 parts finely powdered quicklime, and 11 parts starch. Do not apply longer than two to four minutes, although it is perfectly safe.

Chinese Depilatory: Mix 8 ounces of quicklime, 1 ounce dry pearlash and 1 ounce of sulphuret of potassium, and apply as in the last recipe.

Dessert (dez-zert′), a service of pastry, fruits or sweetmeats at the close of a meal. See Pies, Cakes, Custard, Creams, etc., and the respective fruits.

Devon (dev′on), a breed of cattle. See Cattle, page 175.

Dewberry, a low trailing blackberry, growing sparingly throughout this country.

Dewlap, the flesh that hangs from the throats of cattle, which laps or licks the dew in grazing.

Diabetes (di-a-be′-teez), a disease attended with a persistent, excessive discharge of urine. Most frequently the urine is not only increased in quantity, but contains saccharine matter, in which case the disease is generally fatal. Proper diet is an important matter. This should consist principally of fresh meats, beef being the best. Eat little or no vegetables. Avoid everything from which sugar can be extracted, and drink as little as possible.

Dial, an instrument for showing the time of day by a shadow in the sunlight. . The dial-plate is the face of the instrument, as also the face of a clock or watch, on which the hours are marked. Those who have not a reliable time-piece at hand, have sometimes to observe the time of day by shadows cast by objects standing in the sunlight. Mistakes are often made by supposing the shadow to move at a uniform rate, both winter and summer; whereas, while the shadow of a perpendicular object at mid-day moves over 15 degrees of an arc within an hour, early in the morning and toward evening it scarcely moves over the arc at all, but merely shortens or lengthens. Therefore, in the construction of a sun-dial, one must mark the hours and parts of hours on the floor, ground, platform, or plate (as the case may be), with the aid of a time-piece. Then, to be more precise, an almanac indicating the daily variation of the sun from true clock time should be consulted, for the sun is sometimes as much as 16 minutes too slow or too fast.

Diarrhœa, looseness of the bowels, continuing from day to day and accompanied by straining when at stool. Sometimes a kind of constipation may co-exist. Brought on by acrid and indigestible articles of food, accompanied with cold feet, exhaustive labors, etc.; often produced or aggravated by medicines. This is another complaint for which almost everybody has one or two "sure and safe" remedies. Perhaps the most simple and safe remedy is to take ½ teaspoonful of extract of Jamaica ginger in a litttle water. Sugar may be added to make it more pleasant. Continue this for three or four times and it will relieve ordinary attacks. Every farmer should keep an ounce bottle of this ginger in his house.

Another remedy: Bruise catnip leaves, press out the juice and mix with an equal quantity of sweet cream. Take a teaspoonful once an hour. This simple remedy has cured cases of chronic diarrhœa considered hopeless.

Another: One tablespoonful of double burnt coffee; 1 teaspoonful of ground cloves; 1 teaspoonful of white-oak bark; 1 teaspoonful of dried blackberry root; 1 pint water; boil hard three minutes. Dose, 2 or 3 tablespoonfuls immediately after a passage.

Another: Tincture kino, half ounce; Epsom salts, half ounce; prepared chalk, half ounce. Mix well in half pint of water. Take a wineglassful three times a day.

The non-medicinal treatment is: Warm, tepid or cool injections, according to the sensations; bland diet; and close observance of all the laws of health as given in this work under the head of Hygiene. Astringent medicines produce costiveness, which is followed by aggravated looseness again, by way of reaction, and so on. In most cases drugs cure one disease by producing another, the other disease being generally an obscure and chronic morbid condition.

Diaphoretic (di-a-fo-ret'ic), a medicine tending to promote insensible perspiration. Almost any diffusible stimulant or aromatic, in certain doses, is of this character, and there are thousands of them.

Dibble, an instrument to make holes in the soil, used in transplanting plants with little root. Commonly it is no more than a short section of a spade handle, the lower part shod with iron, and sharp. Steel transplanting trowels are used for larger plants and a small stick for very small plants or cuttings.

Diet: see Food and Hygiene.

Dill, an aromatic plant, the seeds of which are used in flavoring fancy articles of food.

Diphtheria, a disease of the throat, accompanied with general fever, in which a false membrane is formed in the throat, partly visible to one who looks into the back part of the mouth under a strong light. One or more whitish patches may be seen, with unusual redness in the surrounding parts. For treatment, bind a piece of fat bacon or salt pork to the throat externally, and give gargles of sulphur and water. A little of the solution may be swallowed; and even though the case be some other disease than diphtheria, no harm will be done. Of course, all the general principles of treating fever must also be observed. See Fever.

Discount, what is counted off; also, to count off. When a note, for example, is redeemed at 15 per cent. discount, only 85 cents on the dollar is paid for it.

Disease, a deranged condition of some of the organs of animals, or vitiated conditions of their blood, or their secretions. The nature of disease, in general, is an effort of nature to throw off foreign or effete matter,—sometimes to repair a wound or a weak place, or general debility. Some can be traced to very obvious causes, while many are exceedingly obscure in origin; yet most are known to arise either wholly or chiefly from the effects of improper food and bad air. If farmers used due care that all the food of their animals was sound and seasonable, that their barns and cattle-houses were well ventilated, and that no pond or marsh should exist to create miasmata, they would lose comparatively little stock except from accident and old age. In this volume the diseases of mankind are briefly treated under their respective heads, while the diseases of animals are treated alphabetically in the respective articles on the animals, as Cattle, Horse, Sheep, Swine, Fowl, etc.

HEREDITARY DISEASES. No one, of any observation, can deny that hereditary influence exists in the production of disease. This influence must not, in the production of disease, be considered as invariably reliable. The fact of horses or mares having a disease, is no reason why their young will have the same disease also. It was through change or alteration of structure, action or function, that existed in either of the parents, that disease fastened upon them; and these same forms which existed in them are likely to be transmitted to the offspring, thus carrying the various forms of structure which will ultimately, in all probability, produce the same disease. A great number of the affections which are usually styled hereditary do not make their appearance until years after their birth, because it requires time and work to develop them. Few persons would expect a horse with cow hock to become curbed without work, as a secondary cause. There is one other point worthy of remark, in speaking of hereditary diseases, which is that many animals, after being poorly bred, have been badly fed and cared for; whereas, if good feeding and care had been bestowed on them, it would have gone a long way in lessening the certainty of developing hereditary diseases in them and their offspring. This is every day being illustrated in the family of man. There are several rules laid down to be observed as measures to prevent and modify conditions which result in producing diseases of hereditary predisposition. Although these rules cannot, in all cases, be applied to animals, nevertheless, much can be done. The better way will be to avoid breeding from diseased animals. So long as like begets like, there will be hereditary diseases. As a prevention of contagious diseases see Contagion and Disinfectants.

Disinfectants, substances used to destroy the germs of contagion. Deodorizers destroy foul smells, without necessarily destroying also the contagion. The principal disinfectants are chlorine, the chlorides of lime, soda, and zinc, charcoal, carbolic acid, bromochloralum, copperas, the fumes of nitric, nitrous and sulphurous acids, onions and ventilation. Chloride of lime is generally the most available for the disinfection of privy vaults, while copperas water is the best deodorizer of the same. The following compound, although a little more costly, is much better for both purposes combined: sesqui-chloride of iron, chloride of manganese, chlorine and carbolic acid. The sesquichloride is prepared by dissolving the hydrated form in chlorohydric acid, and adding ten per cent. of carbolic acid. The other drugs are then added, and the whole diluted in an abundance of water at the time of using. For stables and slaughter-houses one of the best compounds is a mixture of the chloride and the hypochlorite of zinc. In a sick-chamber, sliced onions, spread out in dishes and set in various places about the room, constitute the most innocent and safe disinfectant in the hands of the unskillful; but a more effectual agent is nitrous acid vapor, produced as follows: Warm a half ounce of sulphuric acid in a glass or earthen cup in sand over a lamp, adding a little niter occasionally. Several of these vessels are placed about the room and adjoining passages, 20 feet or more apart. Carbolic acid, diluted and evaporated, is a convenient disinfectant. For washing a foul surface in or about the body, it is the best material known. For this purpose it must be diluted in about 100 times its volume of water. Druggists generally have it in some diluted form all ready for use.

We cannot here refrain from repeating the general advice, Avoid, as far as practicable, all occasion for the use of any drug, by cleanliness and pure air. The pure air and exercise obtained in out-door life is more than equal to all other health laws together.

The chloride of manganese is as economical a disinfectant as can be used by farmers. It is cheap, efficient and not dangerous like chloride of zinc. For stables and houses filled with animals nothing will answer as well as chloride of lime applied to the floor once a day. For empty houses chlorine gas will be found as convenient and good as any. For its use, see Chlorine.

Heat and cold are two agents highly useful as disinfectants. Heat prevents fermentation and decay by drying and changing the chemical state of substances, as it were, by working, whether by fire or the sun. Cold, again, is the most powerful antiseptic and disinfectant. Frosts prevent decay and disease, and at the same time have the connection existing between them.

Creasote is a most powerful antiseptic and disinfectant when applied to a part, but it is not easily managed. See Creasote, Contagion, Chlorine, Chloride of Lime and Charcoal.

Disinfectant for Rooms, Meat and Fish. Common salt, ½ a tea-cup; sulphuric acid, 2 or 3 ounces; put about ½ ounce of the acid upon the salt at a time, every 15 minutes, stirring, until all is put in. This will purify a large room; and for meat or fish, hang them up in a box, having a cover to it, and thus confine the gas, and tainted articles of food will soon be purified by the same operation.

Coffee, dried and pulverized, then a little of it sprinkled upon a hot shovel, will, in a few minutes, clear a room of all impure effluvia, especially of an animal character.

To Disinfect Water. Bits of iron will prevent water from becoming putrid. Sheet iron or iron trimmings are the best. The offensive smell of water in vases of flowers would be avoided by putting a few small nails in the bottom of the vases.

Unpleasant Odor of Perspiration. This is frequently a source of vexation to gentlemen and ladies, some of whom are very much subject to unpleasant odors arising from perspiration. This may be removed by the following simple process: Mix a tablespoonful of the compound spirits of ammonia with a small basin of water. By washing the arms, arm-pits, and hands with the solution, the skin will be left clean and sweet. The wash is cheap and harmless, and is much preferable to the perfumes and unguents which disguise but do not relieve the trouble.

Dislocation, a displacing of the articular surface of the bones of living animals from their proper situations. The reduction of dislocations is a very important part of human surgery, but in consequence of the very powerful resistance offered to it, and of the imperfect state of mechanical means for overcoming this, the reducing of locations is very seldom attempted in veterinary practice. In man all dislocations are characterized by the same symptoms, pain, shortening of the limb, a depression in one place, near a joint, and an enlargement or swelling opposite. When a bone of the arm or leg is dislocated, place the patient on the floor on his back with a pillow under his head, fold a damp towel around the arm or leg below the dislocation, tie a handkerchief around the towel, sit down on the floor and pull with a slow, steady strain until the joint is set. Sprains should always be treated by perfect rest to the parts, and cold water should be applied constantly. Take a lump of ice, wrap it in a woolen cloth and keep it constantly applied where needed. Never permit warm applications, poultices, or liniments to be applied.

Distilling. Any condensed vapor is a distilled product. To obtain the purest water, get a tin or granite-lined worm (coiled pipe), fix it in a cask, the lower end projecting through a hole near the bottom, the cask to be kept filled with cold water. A pipe leads from the upper end of the worm to a boiler at a little distance. Let the water boil for a few minutes disconnected from the worm in order to expel the volatile gases or organic matter, then put in the connecting pipe, and let the water boil rather slowly afterward or simmer. The cold worm condenses the vapor into water and deposits it into a clean bottle or jug set for the purpose. If such stills were supplied in the general market, it would pay any family to purchase one, in order to have such pure water that no disease of the biliary or urinary system need be feared, and the general health be better every way.

Diuretic (di-u-ret′-ic), a medicine tending to promote the secretion of urine. Diuretics operate more easily and powerfully upon the horse than upon man, and therefore require in veterinary practice to be used with much judgment and considerable caution.

Dock, to amputate the tail of any domestic quadruped, especially of the horse. This practice has been advocated by some for the three reasons of throwing into the rest of the system the portion of blood which would otherwise be expended upon the amputated tail; of improving the appearance of the animal; and of promoting the convenience and comfort of the riders and drivers of horses. The first of these reasons is imaginary and absurd; the second is a matter of vitiated taste, and the third is, in a considerable degree, a misnomer for mere fashion and caprice. All right feeling and all good taste revolt from the cruelty of inflicting upon an animal the violent pain of amputation, and of, at the same time, depriving him of means of defense with which the beneficent Creator has provided him against thousands of torturing attacks of insects; yet so long as blind custom (which is not so prevalent as some years ago) and a reckless regard to a little convenience in man, insists on the docking of the horse, let the operation be performed with as little cruelty to its victim as possible. The amputation should be made at one stroke, against the resistance of a hard board, and without any subsequent application for stopping the hæmorrhage, or at the worst, with the use of a very moderate cautery, so applied as not to touch the bone. Every precaution should be taken that the act of amputation go clear through a joint of the tail without grazing, far less splitting, an articulation of bone. The precise joint of the tail through which the amputation is made is a matter of mere caprice, some persons preferring to leave a considerable portion of the tail, and others to cut almost the whole away so as to leave nothing but a hideous stump.

The docking of lambs is quite common in some sections. It is claimed this promotes cleanliness and prevents the attraction of insects.

Doctoring, medical practice. Of all the crudities of past ages, there was none transmitted to this century so gross and irrational as practical medicine. We would wonder why men noted for learning and intellectual power received it as something approximating to science, and to be treasured as among the most precious gifts to humanity, did we not go further and trace the connection between it and the natural history of man, which gave it its greatest if not its only charm. Up to the time of the Alexandrian school the physician's vocation was confined to the observation of disease, the administration of simples, and the practice of such arts as would forcibly impress the minds of superstitious persons who receive their ministrations. At this time the study of anatomy excited the interest of some of the best minds of the age, and, associated with physiology and chemistry, it has continued to engage the attention of those who could not otherwise have been attracted by it. The complex mechanism of the human body could not but attract the attention of those who were endeavoring to rend the covering of the dark ages and come out into a fairer light. And thus, we will find that in the fifteenth, sixteenth, and seventeenth centuries there were many physicians who became noted, not so much for their success in the cure of disease as in unraveling the tangled web of man's structure and relations to surrounding objects. As regards the practice, it was so gross and many times so absurd as to excite the ridicule of the non-professional.

Such was practical medicine at the beginning of the present century. Disease was looked upon as some fiend to be driven out by harsh usage, and medicine was looked upon as the only weapon which could be effectually employed, and upon which the lives of the sick depended. And this medical weapon was used as a Celt would use his shillalah, striking right and left, and satisfied if it came in contact with something.

Those were the days of copious purgatives, salivation, continued nausea by tartar emetic, copious bleedings, large and painful blisters, shaved heads, etc. They were the days when the tortured patients would cry for water, as did Dives from the burning of hell, but not a drop could they have to cool their parched tongues. They were the days when the sick so lost their strength that they would have to be turned and lifted on a sheet; when ghastly bedsores on the nates and back added to the tortures of the victim. And, lastly, they were the days when the sick slowly recovered from the ill effects of the doctoring, found themselves with diseased joints, carious bones, impaired digestive organs, and impoverished blood, so that at times it seemed almost impossible for them to regain their health.

This is not a very pleasant picture, but it is faithfully drawn; and such was the heritage of this century as regards practical medicine. It savored too strongly of the dark ages and of the inquisition for a period of rapid enlightenment, and there was a popular demand for its reformation that could not but be heeded. The most rapid progress has since been made by all the schools of medicine. Indeed, not only has the profession advanced in the science and art of healing, but the public are much wiser and better posted in the treatment of diseases than formerly. They are not so easily duped and humbugged by the quacks, apothecaries, traveling doctors, soothsayers, fortune-tellers, certain clairvoyants and "spiritual mediums," and the like, as they were a few years ago. People are beginning to realize the fact that every one has the care of his health in his own hands so long as he is mentally and physically able to attend to it, and not until he is helpless or has an ailment he does not understand or cannot treat, should he have physicians or others to take charge of him. Hence we have what is called "domestic medicine," or "home treatment." In every case of emergency there are certain things which the patient can safely do, and should do, until the surgeon or doctor arrives. What is mostly deprecated is the practice of "going it blind," administering powerful medicines, on the theory that "they will do no harm, even if they do no good." Most of unprofessional treatment is undertaken on the strength of a report of some apparently similar case where such a medicine was given and the patient got well. Often they think they have seen with their own eyes the administration of the given medicine with favorable results, but "somehow in the present case it doesn't work just right." When the physician arrives he reproves them for presuming so much and "handling sharp-edged tools in the dark," and claims, often with justice, that they have made the case much worse. Hence, we advise to touch not the powerful drugs until a doctor is called and his advice is obtained, or you have some reliable and safe instructions. The treatment recommended in this work for the various diseases are standard and popular remedies, and such as any good physician might prescribe, should the symptoms be properly diagnosed and found to be similar to those for which the certain treatment is advised. At all times and in all cases, with or without a physician, the patient should have hygienic measures faithfully attended to, as, keeping the head cool, feet warm, breathing pure air, abstaining from improper food, etc. See Hygiene.

Domestic treatment has often cured cases given up by the family physician, and the question has actually been seriously raised by medical professors whether there is not more "quackery" inside the regular profession than out of it. The most common error among all classes of people is the notion that, because a sick person within their knowledge took a certain course of treatment and got well afterward, he therefore was cured by it; for nearly all acute cases will recover anyway, even if let entirely alone. The last thing taken in a course of medicine generally gets the credit of the cure.

In home treatment the most serious difficulty to overcome is to obtain a clear knowledge of the nature of the disease. For example, all fevers set in so much alike that it is generally impossible, the first day or two, even for a skilled physician, to tell just what kind of a fever will be developed. In his haste to satisfy the sufferer and his friends he sometimes names the fever too soon, and when he subsequently discovers his error, he slyly covers it up by remarking that "the fever has changed type."

Every one knows that almost every substance and process in existence is recommended for almost every disease, and this fact alone shows that most people are too forward with their advice. When really asked for advice one is inclined to do a little more careful thinking before giving it. Our endeavor in this volume is to give merely the best or most reliable remedies for common cases. Some cases require a radically different treatment; some of these a skilled physician can discriminate, and some he cannot.

In the selection of a family physician it is best not to take one simply on the ground that he appears to have performed a remarkable cure in the vicinity, or because he is a friendly neighbor, but choose the one who does not pretend to know everything, or to be competent for every case that may be presented,—one who "thinks twice before he speaks once," is punctual in making his calls, is careful in making his promises, and seems to have a moral principle at heart in everything he undertakes. A doctor who is rough in his manners, extravagant in his language, or is given to drinking and lounging, should be passed by unnoticed. How difficult it is for us to recognize the fact that a man may bring about a remarkable cure, in a case now and then, and yet be a very incompetent physician! Doctors make it a rule to *appear* to be adequate to the case in hand whether they are in reality or not; and obscure diseases they can very easily name at random and doctor, without being suspected of error. Any shrewd man can learn in an hour or two a sufficient number of "big words," such as diaphoretic, pneumogastric, gastrocnemius, zygomaticus, etc., to enable him to pass for a learned doctor almost anywhere. We see no way of salvation for the people from becoming the victims of presumption and pedantry.

Most advertising physicians are swindlers. Nearly all "specialists," advertising that they cure private diseases, are as incompetent as those who do not so advertise. The advice of solid men is, Trust no stranger with the care of your body, any more than you would with your money-purse—and for about the same reasons. No matter how long he may have been plying his vocation in a certain city, at a certain number, the "specialist" physician is no more competent and trustworthy on that account. Such is the state of American society that fraud and humbug can flourish along side by side with honesty and industry for many long years. It seems that there should be some more efficient remedy adopted against incompetency in the medical profession—both by law, and by local bureaus furnishing evidences *pro* and *con.* as to the reliability of each doctor in the community. On the other hand, such is the growth of science and useful art that the principle of "subdivision of labor" must be carried into medicine as elsewhere, and to insure the greatest competence each physician should have his "specialty."

MEDICINES, PATENT MEDICINES AND "QUACKS." There is no better man in the world than the true physician, and no more base wretch than the ordinary "quack" or medical charlatan. The physician enters the home, learns its secrets, and indeed holds in his hands, to a great extent, the lives of its inmates. How careful then should we be in selecting one whom we expect so to trust! It is because of the vital importance of this question, and the seeming indifference manifested in the matter by the masses that we treat this question of doctoring so fully.

To be able to detect the spurious from the reliable in medicine, and how to judge between the pretentious quack and the true physician, is our motive in writing this article. We hope to make it valuable, in a practical sense, to those who are exposed to the crafts and villainies of apothecaries, quacks and patent medicine men.

Could the public know what trash in the matter of drugs it pays for—how filthy, vile and often poisonous and hurtful materials people buy for medicine at extortionate prices—they would be dumbfounded—how, even the syrups which they drink in soda drawn from costly and splendid fountains, are often made from the most filthy materials, and are not fit for the lower animals, not to say human beings, to drink.

While there have been great changes in the drug trade during the past fifty years, necessary to the increasing demand for drugs, the establishment of wholesale houses and some specialties, and, in cities, the substitution of cigars, soda water, patent medicines, etc., for groceries and provisions, the dispensing apothecary is nearer to what he was hundreds of years ago than any other professional we know of. The paraphernalia of the shop is nearly the same. There is no improvement in pot, in jar, in tables, in spatula; the old, ungainly mortar is not substituted by a mill; the signs of ounces and drachms remain the same, though so near alike they are often mistaken one for the other, and the prescription before the dispenser is prefixed by a relic of the astrological symbol of Jupiter, "the god of medicine of the ancient Greeks and Egyptians," as a species of superstitious invocation. In the largest cities, even in the shop windows, the mammoth flashing blue bottles, "a relic of empiric charlatanry," still brighten the street corners and frighten horses at night, as in the days of our forefathers. Besides these bottles the front windows contain patent medicines and the flashy signs that announce their virtues. Should you have a prescription filled at one drug store and then go to another for a second quantity of the same, we ask the patient, no matter who or where he is, Did you ever get the same kind of medicine, in look, color, quantity, and taste, the second time, from the same prescription? You will often find it difficult to get the same put up at the very store you got the original prescription compounded.

One of the greatest cheats with druggists is the "substituting" business. Horse aloes may be bought for ten cents a pound. Podophyllin costs seventy-five cents an ounce. They each act as a cathartic, and often the former is used in place of the latter. How is the physician to know the cheat? How is the patient to detect it? Perhaps the former stuff, aloes, may have given the victim the hemorrhoids. One dose may be quite sufficient to produce that distressing disease. This only calls for another prescription. So it looks a deal like a "you tickle me and I'll tickle you" profession at the least. Thus the patient becomes disgusted, and resorts to patent medicines.

Besides the mistakes and humbuggery of the druggists, the conflicting "isms" and "opathies" of the medical fraternity, their quarrels and depreciations of one another, their expositions of one another's weaknesses, frauds and duplicities, so disgusted the common people that they resorted to the irregulars, to astrologers, and humbugs of various pretentions.

"While there is life there is hope," and invalids have and still continue to seize upon almost any promised relief from present pain and anticipated death. Speculative and unprincipled men have seldom been wanting, at any period, to profit by this misfortune of their fellow-creatures, and to play upon the credulity of the afflicted, by offering various compounds warranted to restore them to perfect health. At first such medicines were introduced by the owner going about personally and introducing them; subsequently, by employing equally unprincipled parties, of either sex, to go in advance, and tell of the wonderful cures that this particular nostrum had wrought upon them. To listen to these lauders, one would be led to suppose that they had been afflicted with all the ills namable. The physician created the apothecary, the two opened the way for the less principled patent-medicine vender.

Next we have the mountebanks. These were attendant upon country fairs and in the market places of the cities. They mounted upon a bench (hence the name), cried the marvelous virtues of the medicine, and, by the assistance of a decoy in the crowd, often drove a lucrative business. Finally, upon the general introduction of printing, physician, apothecary, mountebank, speculator, all seized upon the "power of the press" to more extensively introduce their "wonderful discoveries." This has proven more lucrative than all the other plans. When you notice the name—and O, ye gods, such names as are patched up to attract attention!—to a new medicine, systematically and extensively advertised in every paper you chance to pick up, you wonder how any profit can accrue to the manufacturer of the compound after paying such enormous prices as column upon column in a thousand newspapers must necessarily cost. "If their articles cost anything at the outset," you go on to philosophize, "how can the manufacturers or proprietors make enough profit to pay for this colossal advertising? The solution of the problem is embodied in your inquiry. They cost nothing, or as near to nothing as possible for worthless trash to cost. This is the secret of fortunes made in advertised medicines. When we know the complete worthlessness of the majority of the articles that are placed before the public, yea, their more than worthlessness, for they are, many of them, highly injurious to the user, the fact of their enormous consumption is truly astonishing. The drug-swallowing public has grown lean and poor in proportion as the manufacturers and venders of these villainous compounds have grown fat and wealthy.

Said the proprietor of "Coe's Cough Balsam" and "Dyspepsia Cure" to a friend, "If you have got a good medicine, one of value, don't put it before the public. I can advertise dish-water and sell it just as well as an article of merit. It is all in the advertising." As the above preparations were advertised on every board fence, and in every newspaper in the country, did his assertion imply that those articles were mere "dish-water?"

Mr. Johnston, who engineered the advertising of "Spaulding's Glue," stated "it cost but one eighth of a cent a bottle." Yet, what a run it had at hundreds of times that amount!

The pain-killers and liniments are the most costly, on account of the alcohol necessary to their manufacture; and in fact, the principal item of expense in all liquid medical articles, put up for public sale, is in the alcohol essential to their preservation against the extremes of heat and cold to which they may be subjected.

There is an article which "smells to heaven," the acidiferous title of which glares in mammoth letters from every road-side, wherein the audacious proprietor obviates the necessity of alcohol for its preparation or preservation. It is merely fermented slops, "dish-water" minus the alcohol. Take a few handfuls of any bitter herbs, saturate them in any dirty pond water, say a barrel full, add some nitric acid and bottle without straining. Here you have "Vinegar Bitters!" The cheeky proprietor informs the "ignorant public" if the medicine becomes sour (ferments), as it sometimes will, 'being its nature so to do,' it does not detract from its medical virtues. True, true! for it never possessed "medical virtues." The cost of this villainous decoction is scarcely half a cent a bottle. Soured swill! It is recommended to cure fifty different complaints! It sells to fools for "$1.00 a bottle," and will go through one like so much quicksilver. "Try a bottle," if you doubt it. The "dodge" is in advertising it as a temperance bitters. Having no alcoholic properties, it in no wise endangers the user in becoming addicted to stimulants.

Sarsaparilla humbugs are second only to the above. But a few years since an immense fortune was realized by a New York speculator in human flesh on a "sarsaparilla" which contained not one drop of that all but useless medicine; nor did it possess any real medical properties whatever.

Pectorals, wild cherry preparations, etc., are cheaply made.

Oil of almonds produces the cherry flavor. Prussic acid, a virulent poison, and morphine or opium, constitute the medical properties.

The bitter and cathartic properties of nearly every pill in the market, whether "mandrake," "liver," "vegetable" or what else, are made up from aloes, the coarsest and cheapest of all bitter cathartics. One is as good as another. You pay your money, however; you can take your choice. One holds the ascendency in proportion to the money or cheek invested by the owner in its introduction. A great Philadelphia pill now sold in all the drug stores of America was introduced by the following "dodge." The owner began small. He took his pill to the druggists, and, as he could not sell an unknown and unadvertised patent pill, he left a few boxes on commission. He then sent round and bought them up. Their ready sale induced the druggists to purchase again for cash. The proprietor invested the surplus cash in advertising their "rapid sale," and with a little more buying up he got them started. He necessarily must keep them advertised or they would become a "drug" in the market.

Soothing syrups, nervous cordials, etc., owe their soothing properties to opium, or its salt, morphine. From "Opium and the Opium Appetite," by Alonzo Calkins, M. D., we are informed that an article sold as "Mrs. Winslow's Soothing Syrup," for children teething, contains nearly one grain of the alkaloid (morphine) to each ounce of the syrup. Taking one teaspoonful as the dose (that is, one drachm) and there being eight drachms to the ounce, consequently about one-eighth of a grain of morphine is given to an infant at a dose. Do you wonder that it gives the children a quietus? Do you wonder that the mortality among children is greatly on the increase? that so many of the darling, helpless little innocents die from dropsy, brain fever, epileptic fits, and the like?

When a man tells you, point blank, he is selling an article for the profit of it, believe him; but when he asserts that he is advertising and offering a remedy solely for the public good, for the benefit of suffering humanity, he is a liar. Beware of such. Furthermore, when he publishes an advertisement in every paper in the land, announcing that himself having been miraculously or "providentially" cured of a variety of diseases by a certain compound, the prescription for which he will send free to any address, you should hesitate until satisfied of the disinterestedness of the party, and, in the meantime, ask yourself the following question: Provided this be true, why don't the unparalleled benevolent gentleman publish the recipe, which would cost so much less than this persistent advertising that he will send it to any requiring it;

and you are next led to ask, Where is the dodge? for money is what he is after.

Documents, Legal, When Outlawed: see Limitations.

Dodded, hornless: applied to cattle. Generally known in this country as "muleys."

Dog. To no animal is mankind more indebted for faithful and unswerving affection than to the dog. His incorruptible fidelity, his forbearing and enduring attachment, his inexhaustible diligence, ardor and obedience have been noticed and eulogized from the earliest times. This valuable quadruped may be emphatically termed the friend of man; as, unlike other animals, his attachment is purely personal, and uninfluenced by the changes of time or place. The dog seems to remember only the benefits which he may have received, and instead of showing resentment when chastised, exposes himself to torture, and even licks the hand from which it proceeds. Without the aid of this almost reasoning animal, how could man have resisted the attacks of the savage and ferocious tenants of the forest, or have procured sustenance in the ages of the world when agriculture was unknown? Whoever would write the history of dogs must write the history of man, for in periods as remote as history reaches we find this animal associated with him as his useful servant; and, with the growth of agriculture from an almost despised pursuit to a leading place among the industrial sciences, the development of the dog has kept pace until he has become, in each of the various pursuits for which his particular class has been bred, a specific and indispensable aid to man. Though the origin of many, if not all, of the different breeds, is clouded in obscurity, yet the peculiar traits which characterize many of them are so marked as to adapt them perfectly to their own peculiar sphere of usefulness, whether for the farm, the field, the forest, or the pit and prize-ring.

Classification. Some of the latest and best writers have divided dogs into three general divisions, subdividing these again into a variety of classes, embracing the peculiar features which distinguish the different specimens of the race:

Division I.—Dogs Used in Field Sport.

Group 1. Those that pursue and kill their game, depending entirely or mainly on sight and speed, and little or not at all on their scenting powers, with varieties bred directly from them, such as greyhounds, deerhounds, whiffets, lurkers, etc.

Group 2. Those hunting their game by scent and killing it; as bloodhounds, foxhounds, beagles, etc.

Group 3. Those finding the game by scent, but, instead of rushing on it as the hound, assuming a staunch position called a "point," in which they indicate to the sportsman by the direction of their noses the position of the game.

Group 4. Other varieties, used with the gun in questing and retrieving.

Division II.—Dogs Useful to Man.

Group 1. Those specially used as assistants in man's work; as pastoral dogs and dogs used for draught, shepherds' and drovers' dogs, etc.

Group 2. Watchers, and defenders of life and property, life-savers, companion and ornamental dogs, etc.

Group 3. Vermin-destroyers, such as terriers, etc.

Division III.—House Dogs and Toy Dogs.

Group 1. Those of distinct varieties from the foregoing; as pugs, poodles, Blenheims, etc.

Group 2. Those that are merely diminutives of the already mentioned species; as the various toy terriers, etc.

Division I.—Group 1. The *Greyhound.* The source from which this species derives its name is a matter of conjecture, and will probably remain so. Its most prominent physical features are, elongated head, high, proportionate stature, deep chest, arched loins, tucked-up flank, and long tail. Physically the greyhound is one of the most beautiful of dogs, with wonderful powers of speed and endurance in the pursuit of game, and courage and vital force in the killing.

The Greyhound, as a distinct class, may be traced back many centuries. He is found in greatest numbers and perfection in Great Britain, to which country he peculiarly belongs, though found in other countries of Europe at a very early date. His color varies, as also the character of his hair, the latter being smooth in the English, and rough in the Scotch and other species of greyhounds.

The *Scotch Deerhound* is in form similar to the common Greyhound, only more massive, nearly thirty inches high, strong straight limbs, back and quarters, oblique shoulders, neck muscular and of moderate length, long head, broad between the ears, which are small and set on well back and high on the skull. The hair is long and coarse. This breed in its purity is rapidly becoming extinct.

The *Irish Wolfhound*, in all its original purity, is, at the present day, nearly if not quite extinct. His origin is of very early date, being known and highly prized by the Romans. He resembled the Greyhound in general conformation, but was much larger and more powerful than any present known race of dogs, being more than equal to the capture and killing of a wolf.

The *Scotch Rough-Haired Greyhound* is a variety of dog now rarely met with, except at shows and similar places, the popularity of modern coursing having apparently rung his death knell; and although he still exists in an out-of-the-way-place, in his native country he is becoming absorbed in the more modern smooth-skins. The shape of this species corresponds closely with that of the Deerhound, but he is not so large and powerful.

The *Lurcher* proper is a cross between the Scotch Colley and Greyhound, about three-fourths the height of the latter, or from 20 to 22 inches, more strongly built, and heavier boned, yet lithe and supple, his whole conformation suggestive of speed, just as his

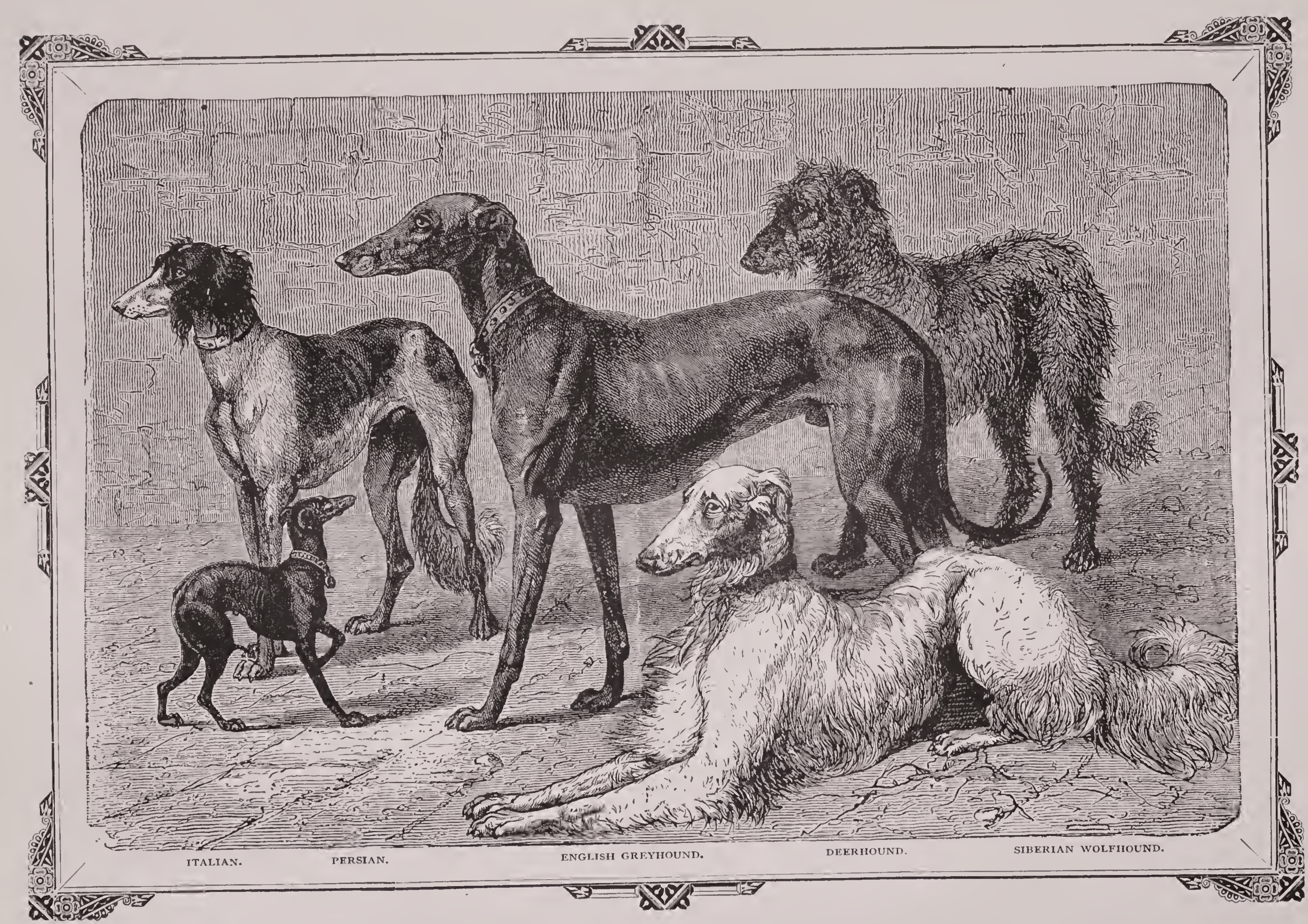


Fig. 1.—GREYHOUND FAMILY.

blinking, half-closed eye, as he lies pretending to sleep, impresses one with his intelligence and cunning. He is bred and used for poaching, and every attribute of his nature adapts him to fill his sphere, whether defending his master, watching at gate or stile to ward off danger while the net is being spread, driving the game into the fatal trap, or creeping up and seizing it while in cover, hunting by sight or smell as necessity demands, and retrieving the game on the one hand or stealing on the other as opportunity may offer, or necessity may require.

The *Whiffet*, or *Snap-dog*, is in appearance a small Greyhound with a dash of Terrier, and in Durham, England, his peculiar community, he is used for racing, and for rabbit coursing, for which he is superior.

The *Siberian Wolfhound* is a dog of the Scotch Deerhound type and much the same in size. The most striking difference is in the color. The grizzle almost universal in the Deerhound gives place here to a mixture of colors. The "Barsee," as this dog is called—is white, with a mixture of dark and light grey and white. In general form and appearance it resembles the Deerhound, and is strikingly handsome and majestic. Mild in disposition and intelligent, faithful and courageous, it is eminently adapted for a companion or an ornament.

The *Persian Greyhound* is a graceful, delicate and rather rare species, being found at English bench shows more frequently than anywhere else. They are similar in form to the greyhound, but more slimly built, with less muscular development, appearing to be an enlarged type of the Italian Greyhound.

GROUP 2. DOGS THAT HUNT THEIR GAME BY SCENT, AND KILL.

The *Bloodhound* stands first in this group as the Greyhound in Group 1. He derives his name from his peculiar power of scenting a wounded animal, so that once on his trail he will single him out from among any number of his fellows, and stick to him through any foils or artifices which he may have recourse to. From this property he has also been used to trace human beings, and as his nose is remarkably delicate in hunting even without blood, he has always been used for that purpose, whether the objects of pursuit were sheep, thieves in England or slaves in Cuba. They were used in the early border warfare. In appearance they are from 24 to 26 inches high; ears from 8 to 10 inches long; lips loose and hanging; throat also loose and roomy in the skin; deep in the frisket; round in the ribs; broad and muscular in the loin and thighs; legs and feet straight and good; of a black-tan, or deep and reddish color; bark, loud, long, deep and melodious; and the temper courageous and irascible, but remarkably forgiving and susceptible to kindness. They are at present most numerous in the South and in the West India Islands, having detriorated in numbers and quality in Britain.

The *Foxhound* is the hunting dog upon which the breeder of coursing dogs has bestowed the greatest pains, and his efforts have been rewarded by the attainment of the highest degree of excellence, in the union of fine scent, fleetness, strength, perseverance and temper. He stands usually from 20 to 22 inches high at the shoulders, and is of a white color marked with large spots of black or tan. He has been known to get over four miles in seven minutes, and his powers of endurance are equal to his speed. Foxhounds are hunted in packs, and following the hounds is in England the most popular field sport.

The *Otterhound* is supposed by some authorities to be a cross between the Bloodhound and Terrier, by others, a cross between the Southern Hound and Water Spaniel, while some assert that his hardiness, courage and tenacity are derived from a cross with the Bulldog. In general appearance (always excepting the coat) he resembles the bloodhound, symmetrical, strongly built, hardy and enduring, with unfailing powers of scent, and a natural antipathy to the game he is bred to pursue. A native of Britain.

The *Harrier* is so called from being bred and kept almost exclusively for the pursuit of the hare. He is in appearance much like the Foxhound, with head heavier in proportion, skull flat and broad, the ears set on low, and close and fine in texture. The coat is short, fine and dense, while the color is a variety of combinations. Delicacy of scent, and perseverance, are the essential qualities of the Harrier.

The *Beagle* is a miniature hound that resembles, in appearance and form and trait of character, the Harrier; is old as a class, being used in Elizabeth's time and earlier. They vary in size and appearance, being made to suit the fancies of owners and breeders. They might not improperly be called a fancy hound.

The *Basset* is a low hound of French and Belgian nativity, his name being derived from the French word *bas*, meaning *low*.

The *Badger* Dog is a short-coated, long-backed dog, on very short legs, weight from 18 to 20 pounds, the bitches being somewhat lighter than the dogs. They are self-colored; the color most in fashion just now is fallow red, and black and tan, though there are good specimens of various shades of red, more or less smutty, as well as brown with tawny markings. The head resembles that of the Bloodhound, and the ears are long and pendulous, eyes lustrous and mild, and a general conformation which admirably adapts them for the purpose for which they are used, drawing their game from the burrow.

The *Swiss Hound* is a German hound of medium height and long, strong body, medium-sized head and tolerably long ears, broad chest and sloping shoulders; hair short and greyish brown. A native of Germany.

GROUP 3. DOGS THAT FIND THEIR GAME AND INDEX IT FOR THE GUN.

The *Setter*, as a hunting dog, has been developed by the most careful and scientific course of breeding until he has reached a very high state of perfection, both in Britain and America. There are several species of Setters, the principal ones being the English, Irish, and Gordon, and the English is subdivided into two classes known as the Laveracks and Llewellyn, the latter designated by Mr. Purcell Llewellyn.

The general appearance of a well-bred Setter is very pleasing to the eye. He is so nicely put together as to present a well-balanced whole, showing capabilities of speed and endurance, and his expression shows a high order of intelligence; his disposition is gentle, and he exhibits a strong desire to please. No breed excels him in elegance of form, and his beauty is increased by his long, silky coat, and profuse though not over-abundant feathering. The head is lean and long, not so thick as the pointer's, and with a high, full top showing plenty of brain; and the jaws should be long and level, with clean, white, strong teeth that meet together evenly (a feature on which dog fanciers lay great stress); face dipped below the eyes; nose wide and black or liver-colored, varying with the color of the dog; lips clean cut, and loose eyes, set straight, bright, clear and animated, of a brown color and shaded according to the color of the dog. The ears are of medium size, set low, and hang straight, and are thin, and covered with fine, silky hair that hangs down two or three inches below the leather. The body is strongly and handsomely formed, the legs strong, straight in front, bent at the hock behind, and well fringed; the tail is of medium length, slim (an important feature) and well fringed, and is carried at a gentle curve. No other dog is more intelligent or tractable, or capable of a finer development under skillful training. He is taught to work a field in quest of game, to right and left before his master, to stand and point when he winds the game, and hold a rigid position till the hunter arrives and bids him put up the bird, to drop when the bird takes wing and lie till the gun is reloaded and he is bidden to advance, which he will then do cautiously, till the next bird is scented, when he again points, repeating the performance until the entire covey are killed; then he will carefully hunt up and retrieve the dead and wounded birds without injuring the appearance of a feather, showing throughout the whole a desire to please his master, which supersedes every other instinct. So highly is he esteemed by all classes of society, both in the Old and New World, that he is undoubtedly the leading dog of this day.

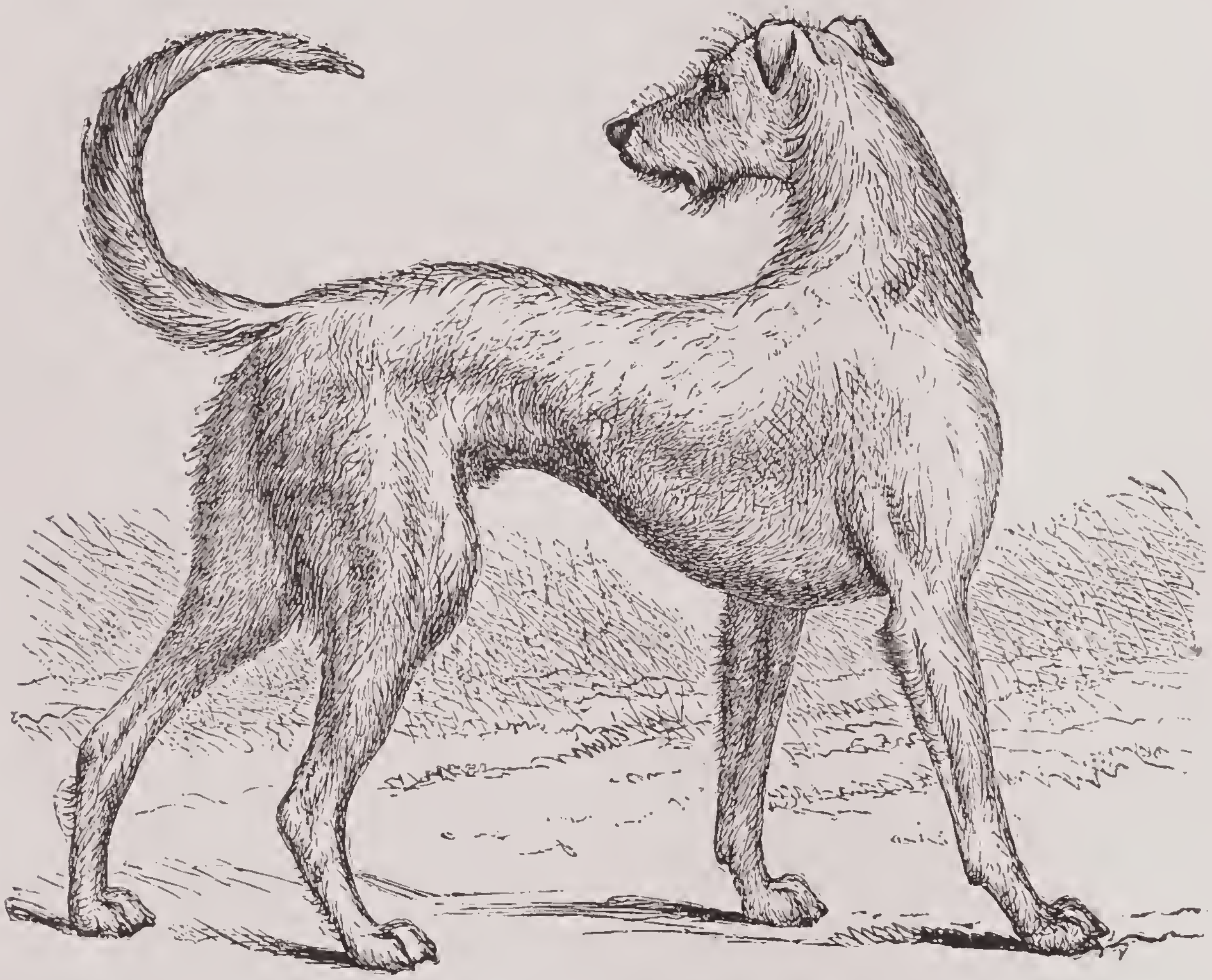


Fig. 2.—*Irish Wolfhound.*

The *English Setter* is found in two distinct strains, the Laverack and Llewellyn, the former the oldest, as a separate family, though the two bear close resemblance to each other. They are white and black, or liver-colored, usually, though the lemon and white is often found.

The *Irish Setter*, in general features, resembles the English Setter, being generally of a lighter and more wiry appearance; his color is deep red with white spots that should be as few and small as possible. He comes originally from Ireland, and can be traced back as far as any family of Setters. He is inclined to be headstrong, susceptible of fine training, and is an untiring worker. There is no class of Setters more highly valued among sportsmen.

The *Gordon Setter* is supposed by some good authorities to have sprung from a cross of the English and Irish dogs, and some assert that they possess a mixture of Colley. He gets his name from being bred by the Dukes of Gordon, in an early day. He is also called "Black and Tan," from the fact that he is distinctly marked by tan spots on the feet, feathers of the leg, under the stern, on the vent, cheeks, lips, and in spots over the eyes. He is heavier built than the English, and more docile than the Irish Setter, and is capable of enduring great fatigue. The Setter is supposed either to have descended from the Spaniel, or else both are off-shoots of the same stock.

The *Pointer* was introduced into America from England, and is supposed to have been taken there from Spain. He has always been considered in England a distinct species, used and trained only for the one purpose of hunting and pointing birds; he possesses a strong innate tendency to point, and a keen scent; is somewhat taller than the Setter, though not so large a dog as formerly, the size having been reduced by breeders with the object of increasing their speed. They are more easily trained than the Setter, though less companionable. They are rapid workers, and careful retrievers when well trained. Well-bred and developed Pointers possess good bottom, fine form, and symmetrical proportions. The color is varied, and as an indication of value in breeding, is immaterial; superior dogs in the field being found in all colors, though the most prevailing colors are white and black, white and lemon, white and liver, or wholly liver-colored; or sometimes, but more rarely, black, the favorite colors, though, being white and liver or lemon, or liver-colored.

The *Spanish Pointer* need only be referred to as the source from whence the Pointers of the present day are derived; he is a dog of the past.

The *Dropper* is a cross between the Setter and Pointer, and often as good a field dog as either, but of no value for breeding.

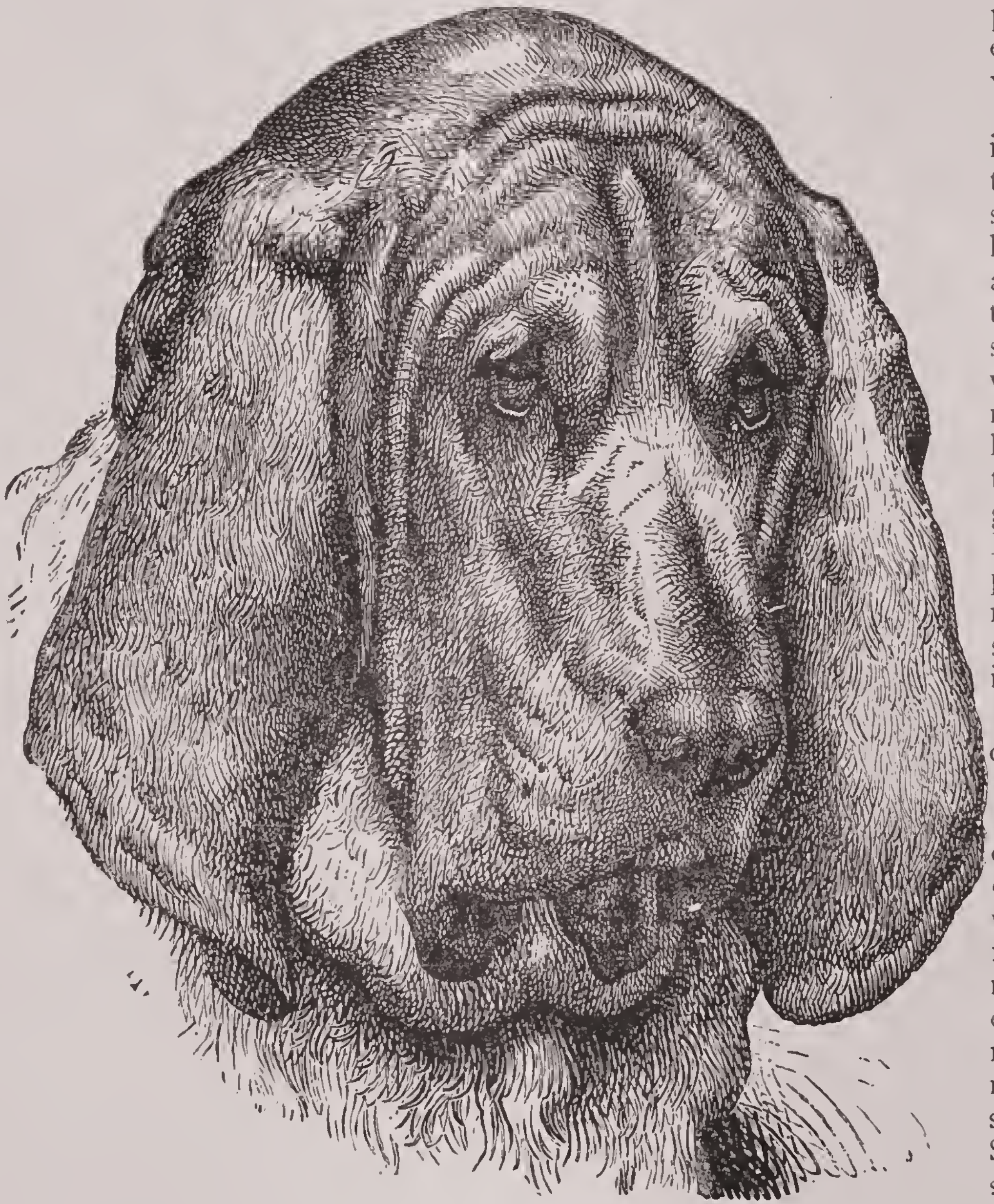


Fig. 3.—*Bloodhound.*

GROUP 4. DOGS USED WITH THE GUN IN QUESTING AND RETRIEVING.

The *Spaniel*, which is one of the kindest, most companionable and intelligent of dogs, has been bred in England for many centuries, and used for hunting and retrieving. The different varieties are in many cases named from the particular game which they are designed to hunt, though the many different varieties of the present day are to a certain extent the result of the variety of efforts and tastes of many different breeders.

The *Black Spaniel* has a long head, long muzzle, rather deep than square or pointed, ears set low, long, lobe-shaped, and well feathered with long silky hair, dark, full eye, long, muscular neck, well covered with hair, long barrel and muscular back, heavy muscular shoulders and deep chest, strong short limbs, moderately round feet with hard, thick soles; tail medium length, well feathered, and not carried higher than the back.. Coat jet, glossy black, free from rustiness, soft and silky in texture, long and free from curl. A few white hairs on the chest are no detriment.

The *Cocker Spaniel* resembles the Black in general conformation; he is found in all colors, liver, black, white with liver or black, and in these mottled on fore legs, etc. He is a beautiful, intelligent, clever, companionable dog, though at the present time yielding place among breeders to the larger varieties.

Clumber Spaniel is an English variety, highly prized in some parts of England. He is heavier and more sedate than those just described, an untiring worker and a good retriever, with a keen nose, and, though grave, a good disposition. In general form and physical features resembles those described; in color, he is white and lemon.

Sussex Spaniel is one of the oldest known breeds of English sporting dogs. He had become nearly extinct, when, in 1870, a number of prominent English breeders set to work to revive the breed, meeting with great success. The Susex Spaniel should weigh from thirty-three to forty pounds, and be of a liver or golden liver color.

The *Norfolk Spaniel* belongs to the Springer branch of the family. The Norfolk Spaniel weighs about 40 pounds, and generally liver and white in color.

The *Irish Water Spaniel* has no equal as a retriever from the water, and is unexcelled in his companionable qualities. His prominent features are endurance, pluck, sagacity and intelligence. His coat is a succession of hard, short curls of a dark liver color, his face is smooth and surmounted by a triangular topknot of hair, which, when full grown, is four inches in length, the apex being downward and terminating between the eyes. The ears are very long and heavily fringed, and tail is thick and covered with curly hair for about three inches from the body, when it becomes smooth and runs to a sharp point. The fine specimen of this dog illustrated on page 330 is the dog Sinbad, owned by J. H. Whitman, of Chicago, Ill.

The *English Water Spaniel* is a somewhat taller dog than those already described, weighs from 30 to 40 pounds, coat thick and closely curled, usually white and liver in color, the whole face and skull covered with smooth short hair, and heavily feathered on the legs. His point of excellence is retrieving water-fowl.

The *Retriever* is a dog used for recovering dead or wounded game. The term "retriever," as applied to any particular race of dogs, is indefinite, any dog that is well broken to recover game being in the full sense of the word a retriever, though several classes are bred in England, at the present time, especially for retrieving; but they are the productions of other breeds, and are too indefinite in feature to make a minute description possible.

Division II.—Group 1.—Dogs Useful to Man.

The *Colley* is, to the rural classes of this country, unquestionably the one of the most interest and value. His sagacity, intelligence, hardihood, devotion and affection for his master are remarkable. The name "Colley" is often applied to any shepherd's or drover's dog, but the Colley proper is the Scotch shepherd dog. There are, also, the Britain, the Southern shepherd dog, and a larger species, called the Drover's dog. These have all been imported, more or less, to this country, and form a valuable addition to our dog races. The Scotch Colley is a rough-haired dog from 12 to 14 inches high, and is regarded as purer bred than any other race of Shepherd dogs. The Southern Sheep dog is somewhat larger and smoother haired, and the Drovers' dog is taller than either, of a black and white color, and is principally used in driving droves and flocks. Shepherds train their dogs for sheep by separating them from the litter and suckling them on the sheep, keeping them in the pen and never allowing them away from the sheep or with other dogs, or in the family of the owner, being even regularly fed in the sheep-fold. In color the Colley is nearly always black and tan, with little or no white, hair thick and woolly, nose sharp but not long, ears short and sharp, tail long, bushy and curved, and on the hind legs can always be found one or two dew claws if he is well bred. The eye and face are unusually bright and keen, and indicate the high order of intelligence which he possesses. There is no limit to the amount of education, in his own field of usefulness, of which he is capable, though he shows little or no tendency to learn tricks for exhibition.

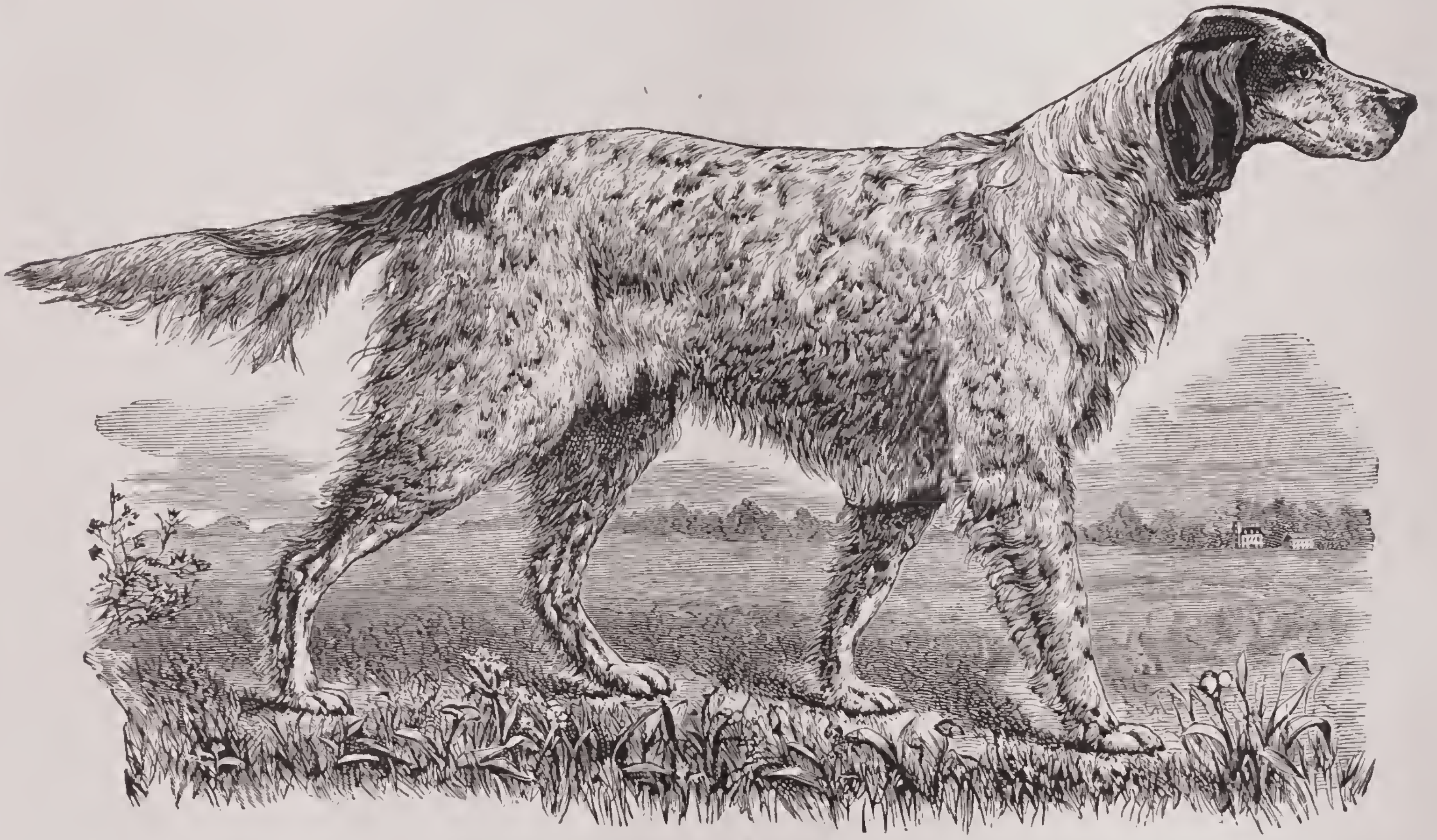


Fig. 4.—*English Setter.*

The *German Sheep Dog* is a small, wiry, active, long-haired dog, of a dark or tawny color, bright, active and affectionate.

The *Esquimaux* dogs are natives of the northern part of America, and are employed to carry burdens, or draw the sledge, to which they are harnessed in teams of from seven to eleven in number. Each dog is capable of drawing 100 pounds. In summer they are turned out to hunt their own living, and they fatten on the offal of the walrus and seal. The Esquimaux is difficult to describe, being found in all colors and shades from black to white, and in all sizes from

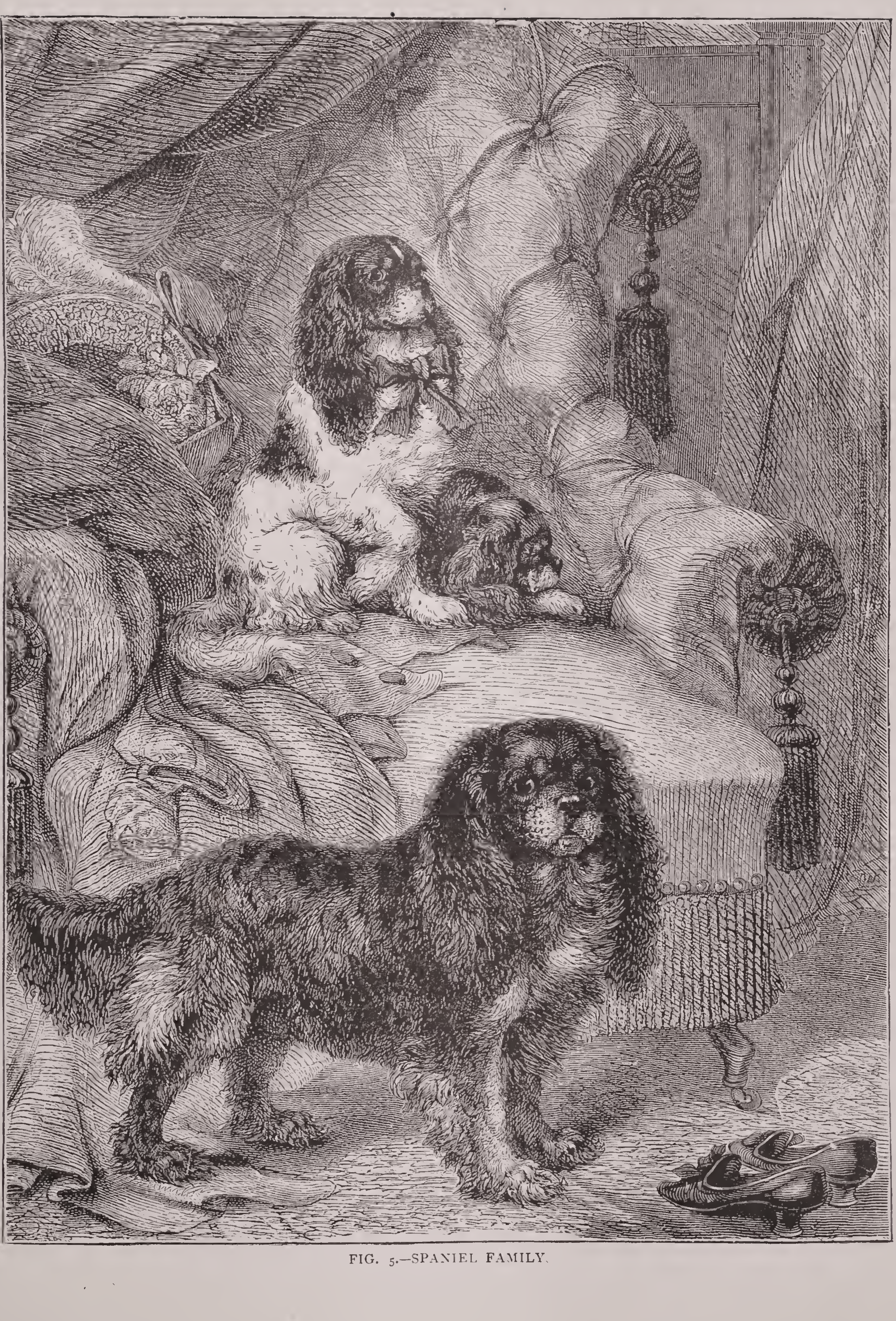


FIG. 5.—SPANIEL FAMILY.

22 to 30 inches high, and including the draught dogs of Siberia, Greenland, Kamtschatka and Labrador.

GROUP 2. WATCHERS AND DEFENDERS. The *Newfoundland* is undoubtedly a native of the island from which it takes its name and where it is used as a beast of burden. In its native isle he is of great size, reaching to the height of 30 inches, with a form proportionally stout and strong, but loosely put together, smallish head, wide between the eyes, eye and ear both small, the latter drooping, evenly formed body, strong, though not long legs, broad feet, coat long, hair shaggy, shining and black, with sometimes a mixture of white or liver color, reddish dim or dark brindle, but rarely. His principal features are his propensities to "carry" and "fetch," to bring objects from the water, and to guard property and persons against danger.

The *Landseer Newfoundland.* A class of dogs which is claimed by its admirers to be pure-bred Newfoundland, is the large black and white dog so often seen in this country. Opinions differ very considerably on this point. The best informed authorities are unanimous in pronouncing the species to have been originally a splendid mongrel, possessing many prominent Newfoundland points, but deficient in some characteristics of the pure breed. As a companion this dog is highly appreciated, and his markings certainly render him handsomer than the black dog.

The *St. Bernard*, of the present day, is a powerful animal, with close, short hair of a sandy, red, tawny, greyish or liver color, pendulous ears, and giant frame. They are kept by the monks of the Hospice of St. Bernard, for the purpose of rescuing travelers lost in the mountain snow storms. They are sent out in pairs, one bearing a flask of spirits the other a cloak, and conduct the traveler when found to a place of safety if he is conscious; and if not they arouse the monks by their loud bark, while they dig him from the snow and endeavor to drag him to a place of safety. Their scent is keen, and their sagacity unsurpassed.

The *Mastiff* equals the Bull-dog in courage and excels him in strength, intelligence and mildness of disposition, not attacking without considerable provocation, and bearing with the greatest good nature the teasing of children; sagacious and faithful as a watch dog; very much attached to its master, but soured in temper by confinement. It stands 30 inches high, is powerfully formed, heavy head, pendulous lips and ears; long, tail and short, thick hair of a buff color.

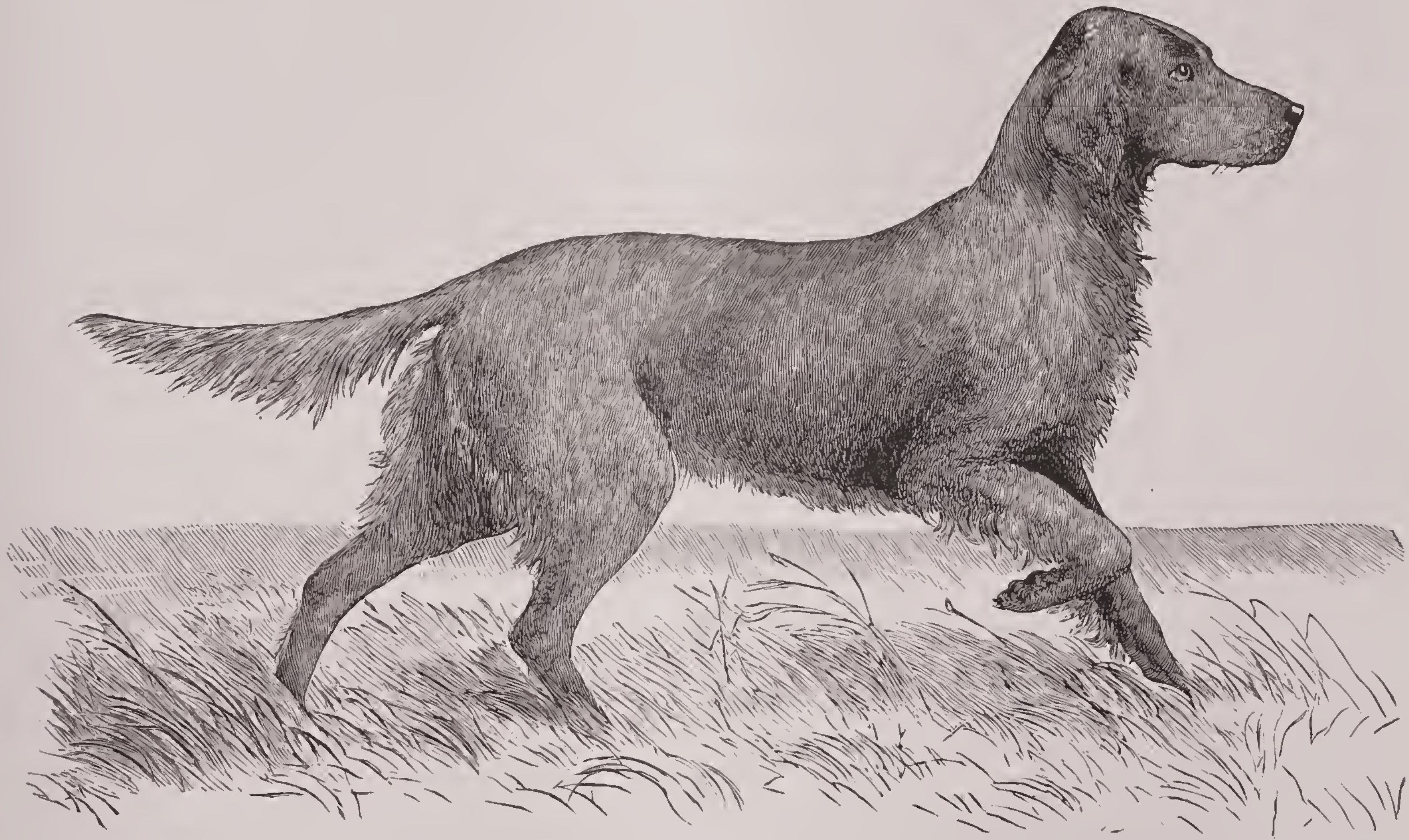


FIG. 6.—*Irish Setter.*

The *Bull-dog* is the least sagacious and most ferocious of all the dog fraternity. He is smaller than the Mastiff, strongly built, short nose, small ears, partially erect, projecting under jaw, strong limbs and tail, and brindled or black and white color, sometimes a reddish lemon. His chief characteristic trait is his tendency and ability to hold his grip. He is essentially a fighting dog, and though used for a watcher, there are better dogs for that purpose. He usually bites without barking.

The *Dalmatian*, or coach dog, is a beautiful animal, of a white color, thickly marked with even-sized, round, black spots He is exceedingly fond of horses, and his home is in the stables or carriage-house. He is handsome as an ornament, and though sometimes useful as a watcher, there are more valuable dogs.

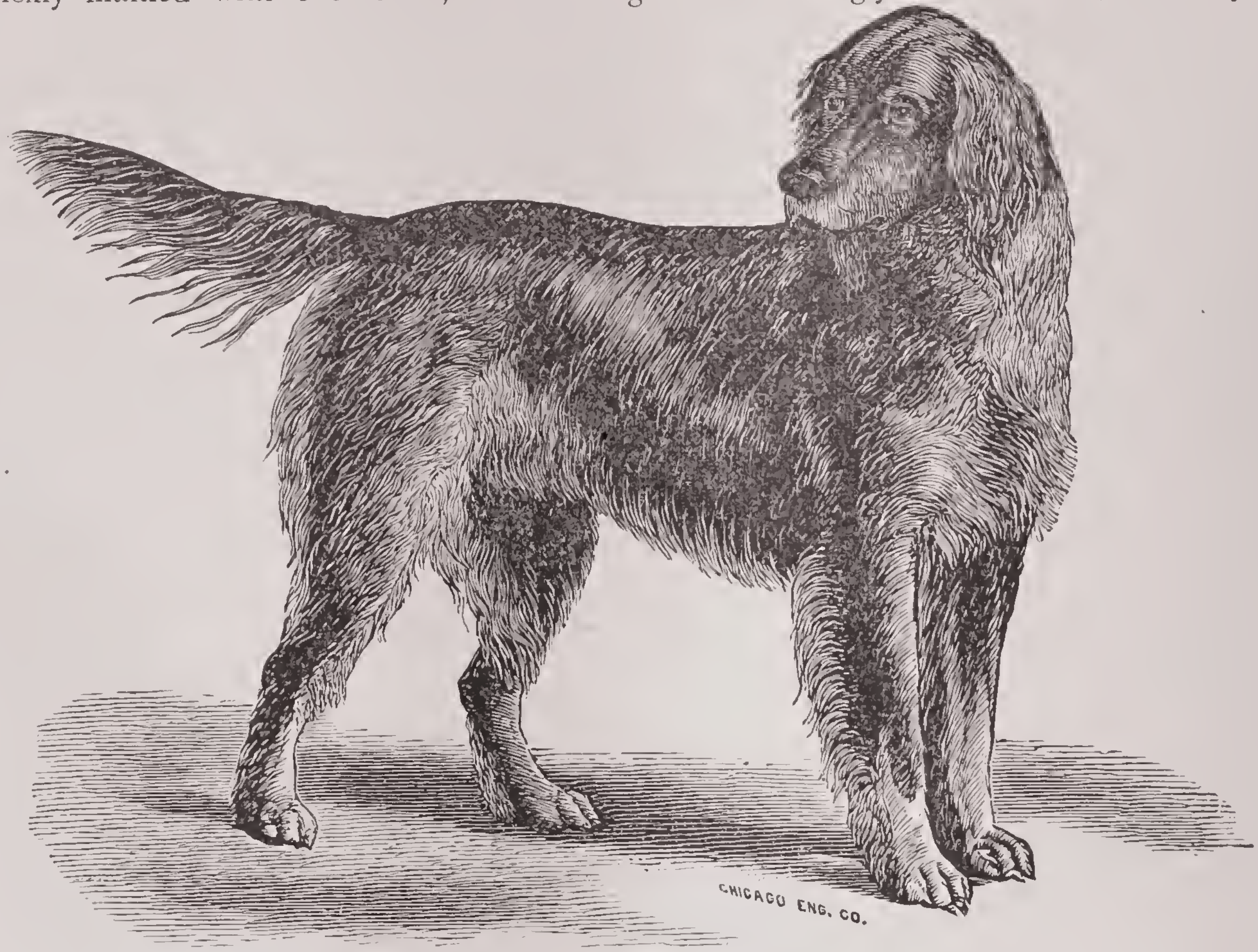

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Fig. 7.—*Gordon Setter.*

Group 3. *Terriers* are of many varieties, and are a small but very distinct breed, being probably one of the oldest known. Three distinct varieties exist in this country,—the English, smooth and graceful in form, sharp muzzle, erect ears, compact body, strong, though slender limbs, and tail curved aloft. His color is black, with legs sometimes tan. The Scotch differs from the English in being of a shorter limb and muzzle, and a rough, wiry coat of dirty, greyish or white color. The Skye is distinguished by the length and coarseness of its hair, the shortness of its limbs, and the length of its body. It is of a light drown color. The Terrier has no equal in usefulness as an exterminator of rats and other vermin, and as a watch dog he is exceedingly wakeful, acute, and noisy.

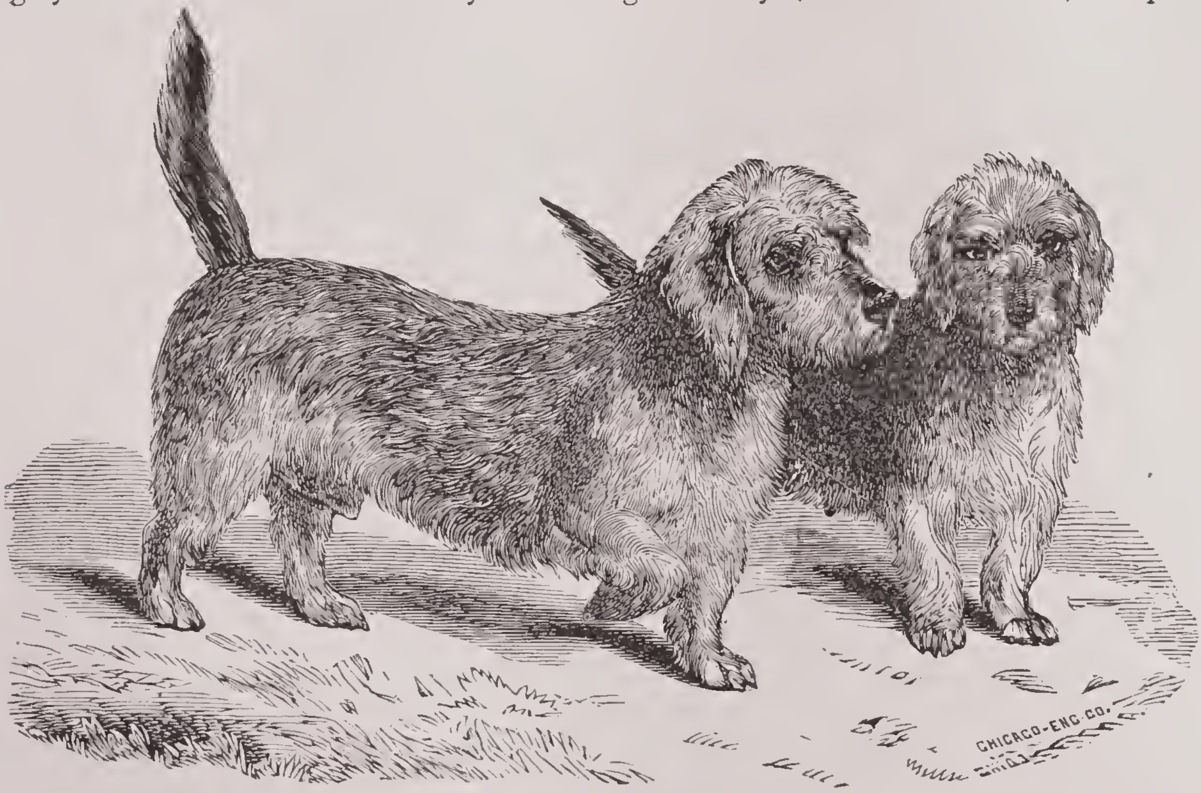
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Fig. 8.—*Dandie Dinmont Terriers.*

Division III.—House and Lap Dogs.

The *Pomeranian*, or *Spitz*, is a native of Germany, and of little use, except as a toy, for he is too snappish in disposition to make him a safe companion for children. He is a woolly dog, with an ample frill, which effectually protects him against wet and cold. His intelligence is not of a high order.

Pugs are beautiful and bright little toy dogs from six to ten pounds weight, low and thick set, with short legs and body close to the ground, possessing an elegant outline, fine hair, of a fawn color with black shades. The nose is short, though not turned up, and a bright, sharp countenance, as is shown by the illustration, Fig. 12.

The *Blenheim*, the *King Charles*, and other toy spaniels may be generally described as resembling in form and outline the English Water Spaniel in miniature, weighing only six or seven pounds.

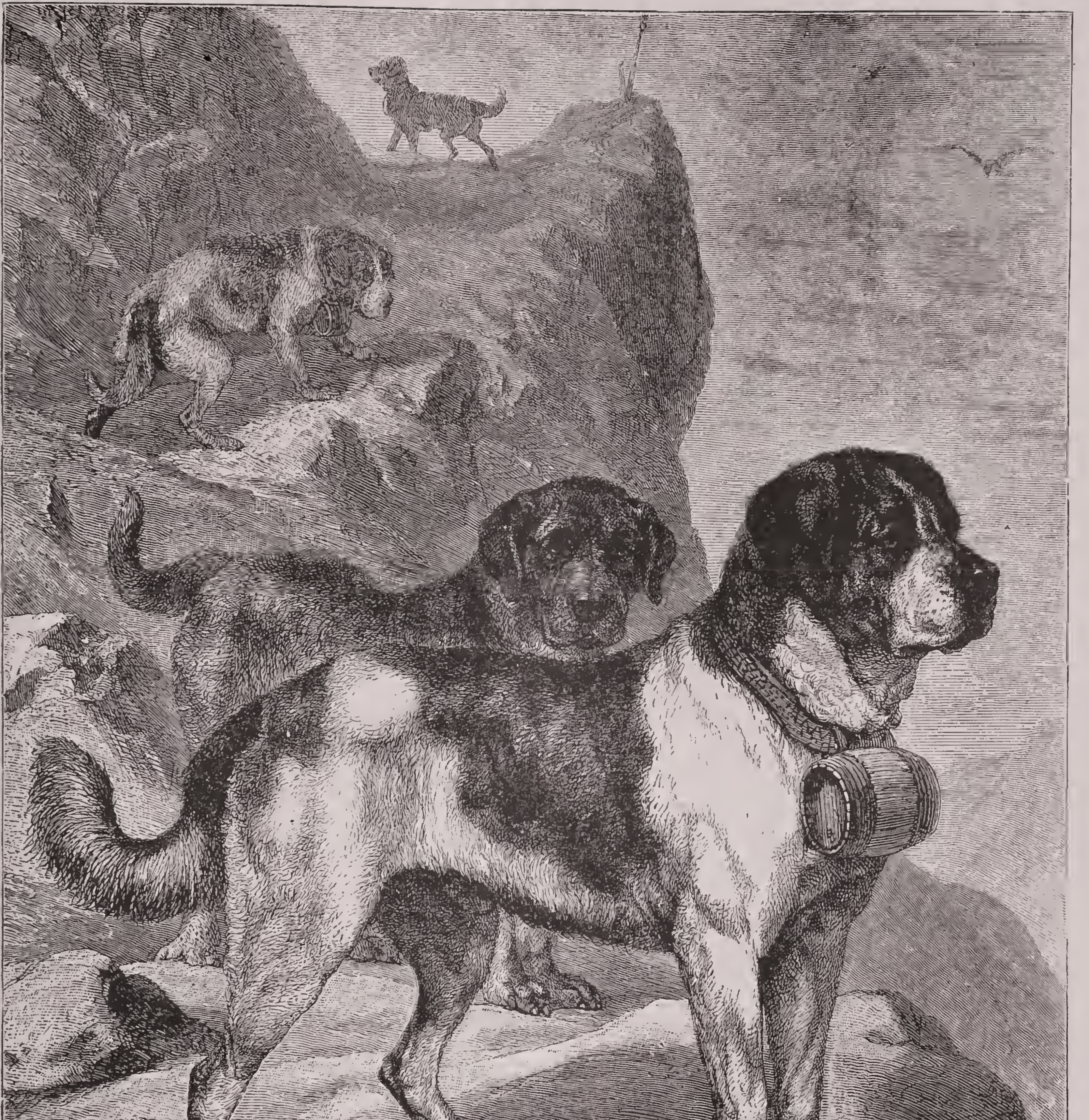

FIG. 9.—ST. BERNARD DOGS.

The *Maltese* is a Skye Terrier in miniature, with a far longer and more silky coat and a shorter back, and weighs six or seven pounds.

The *Lion* dog appears to be a cross between Poodle and Maltese.

The *Shock* dog is a cross between Poodle and Spaniel.

The *Italian Greyhound* can be called only a toy dog, for though of typical conformation as a greyhound, its size is only that of a toy dog, not exceeding ten pounds. Its color is fawn in various shades, and its hair is of the shortest. Its home is Spain and Italy.

As a dog which it is difficult to class with any of these may be mentioned the *Marylander*, bred from a pair of small Newfoundlands taken to that State about 1807. They are a medium-sized, hardy, sagacious and useful race of dogs, both as watchers and retrievers from water.

The *Cur* was formerly defined as a cross between a sheep dog and a hound; but the accepted meaning of the present day is a mongrel, or a dog of no particular breed or cross.

The fine illustrations of the various breeds of dogs presented in this article are from the *American Field*, the canine authority of America. These embrace noted specimens of their several strains bred in England, importations into America, and dogs bred in America whose ancestry originated in Great Britain. Gentlemen who are interested in field sports will find no better paper to keep them thoroughly posted in the progresses of the day than the *American Field*. One of its chief and most valuable departments is the Kennel. In this is discussed by the ablest writers in this country the proper method of breeding, training, caring for and using dogs; the safest way to buy, and where, and the best way to sell, when and where, etc.

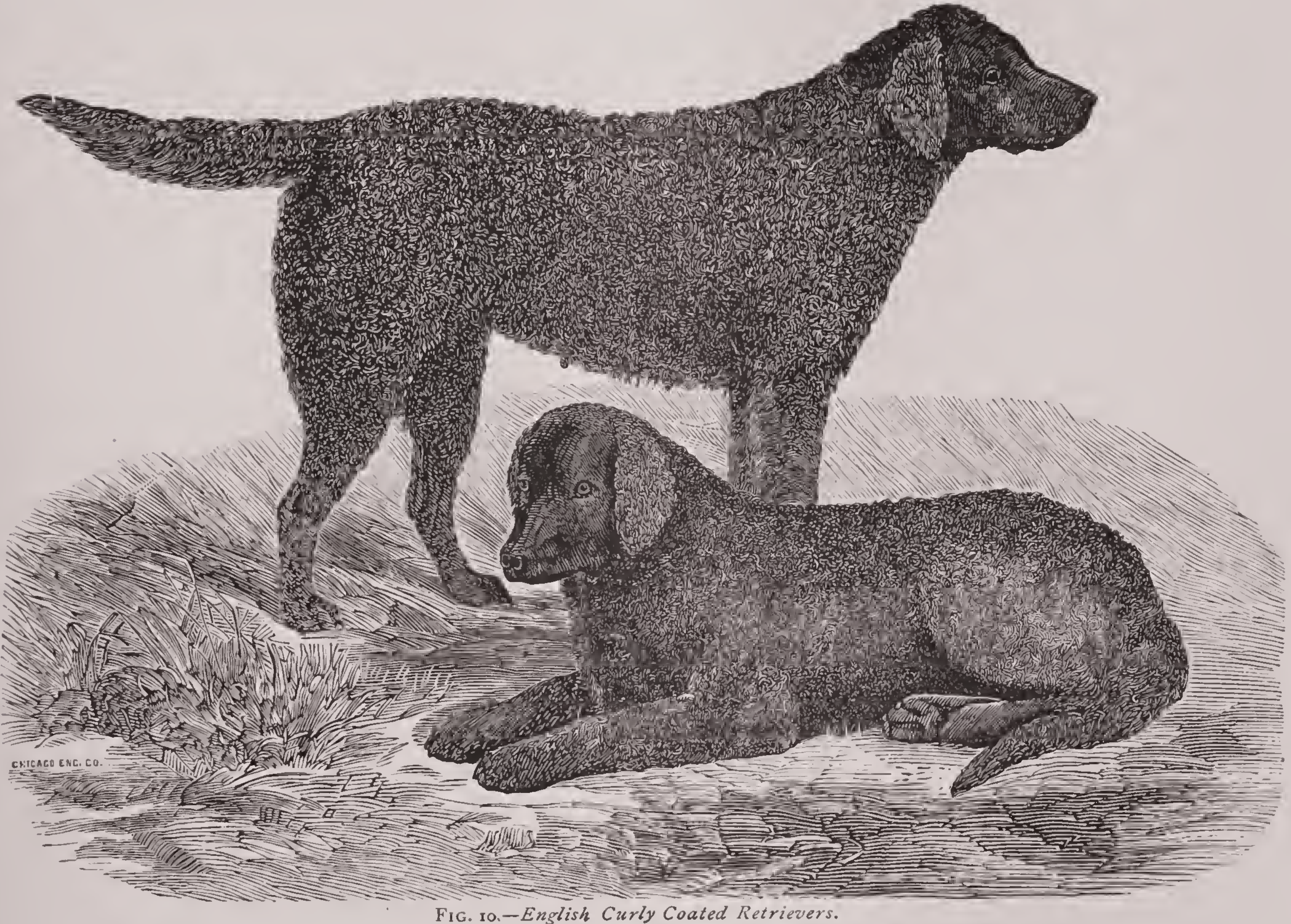
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FIG. 10.—*English Curly Coated Retrievers.*

The *American Field* is conducted upon the most liberal and enterprising basis, and as a sportman's journal ranks any published in the United states. It is published by the American Field Company, Chicago, Ill.

TRAINING. The value of a dog in the field depends on the manner in which he has been trained, and though training a dog is a science which can only be successfully manipulated in all its details by a professional, yet much may be done by an amateur who is willing to conbine patience, kindness and good sense in making his efforts. The first step in making a good hunter of a young dog, is to gain his confidence and

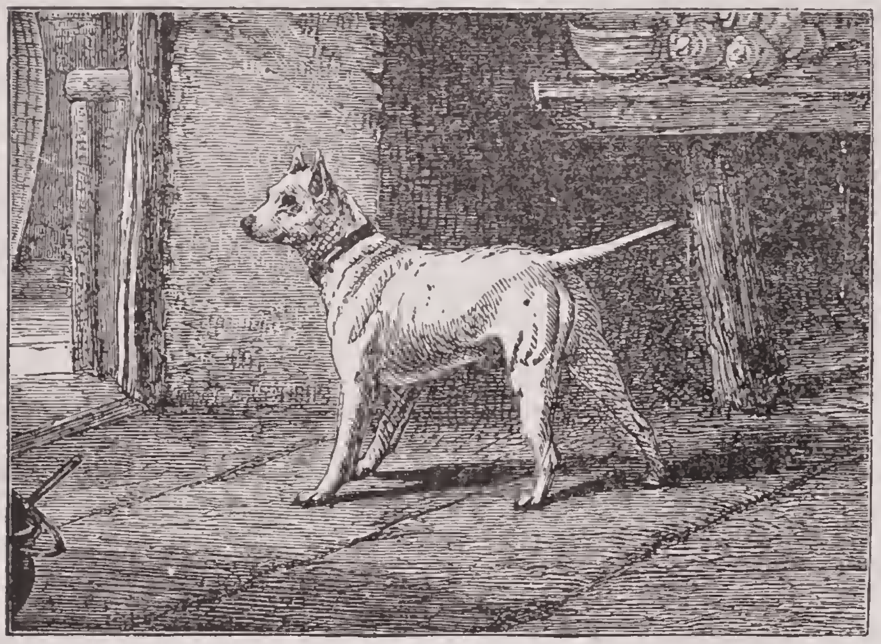

Fig. 11.—*Fox Terrier.*

affection; the first lessons should be directed to securing absolute obedience. When he is taken into the field and when first scenting a bird, great pains should be observed to teach him to stand and await the action of his master. Now step in front of him and raise the bird, making him drop as it takes wing; and a shot should never be fired over him until he will do this satisfactorily. There is no part of his training with which it is more necessary to take pains than this, if you would have a good dog. Having well taught him to drop to wing and remain, until started, it will be in order to commence shooting, never firing a shot, however, at a bird which he flushes, or upon which he has not worked well. Teach him to work the ground for any live birds that may remain, before retrieving dead ones, and never allow him to retrieve until bidden. Keep him close at first, gradually giving wider range and teach him to quarter (work to right and to left) the field. Do not be afraid to use the whistle to keep him under command, and turn him to right or to left by a motion of the hand. A dog should never be shot at, to enforce obedience, but chastised with the whip; and when punishment is necessary, do not call him in, but go to him. Be kind, firm, and persevering. If he handles dead birds so roughly as to injure them, he can be broken by putting sharpened wires through a dead bird in such a manner that they will hurt him when he grips the bird too tightly; but this should not be done until he is well broken to retrieve; then unknown to him substitute the prepared bird for the one just killed and let him retrieve it. If gun-shy, he can be broken by coupling him to a good hunter with couples made for the purpose, and a day or two will usually suffice. Another way is to starve the dog until he will eat without fear while a gun is being fired over him. A rank dog may be taught not to break in, by the use of a check cord, to which many good sportsmen add a spike collar.

The training of a farmer's dog for the purposes of aiding the shepherd or the drover, is a task that requires patience and judgment. A good plan of training a sheep dog has already been suggested, and the same idea may be practically carried out with the cattle dog. Take him from the litter to the stock yard, keep him with you amongst the stock, be kind and patient, use him as much as you can to aid you in driving, etc. His natural instinct, if he is a good pup, will aid you, and by degrees you will work him into intelligent and useful habits that will render him valuable.

In many most important respects dogs are just like horses: they will do what you want of them if they only understand what you do desire. Many people are very stupid in expressing themselves, and because they are not understood they cruelly treat the person or animal they spoke to. The dog has all the sensibilities and affections of mankind, and if he is only treated on the same general principles of kindness and clearness of expression, he is

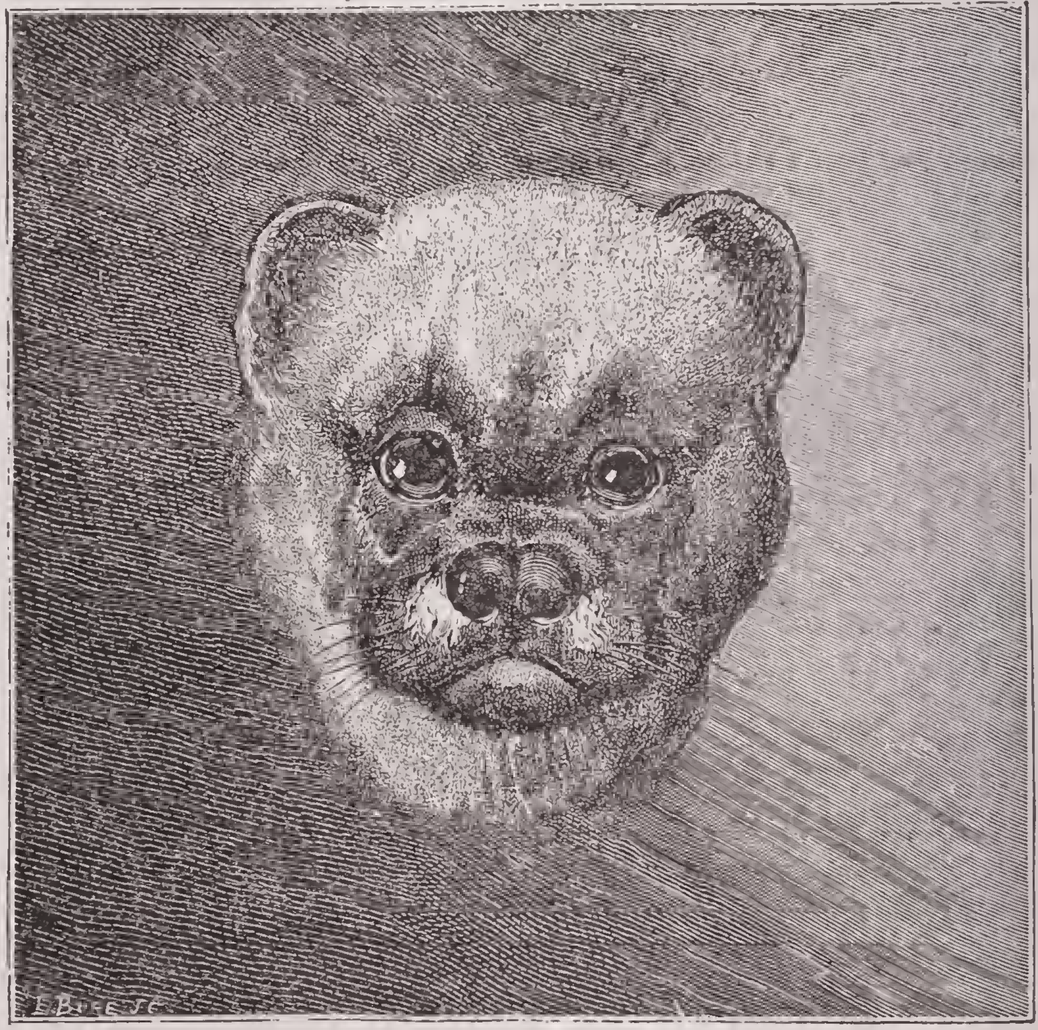

Fig. 12.—*Pug.*

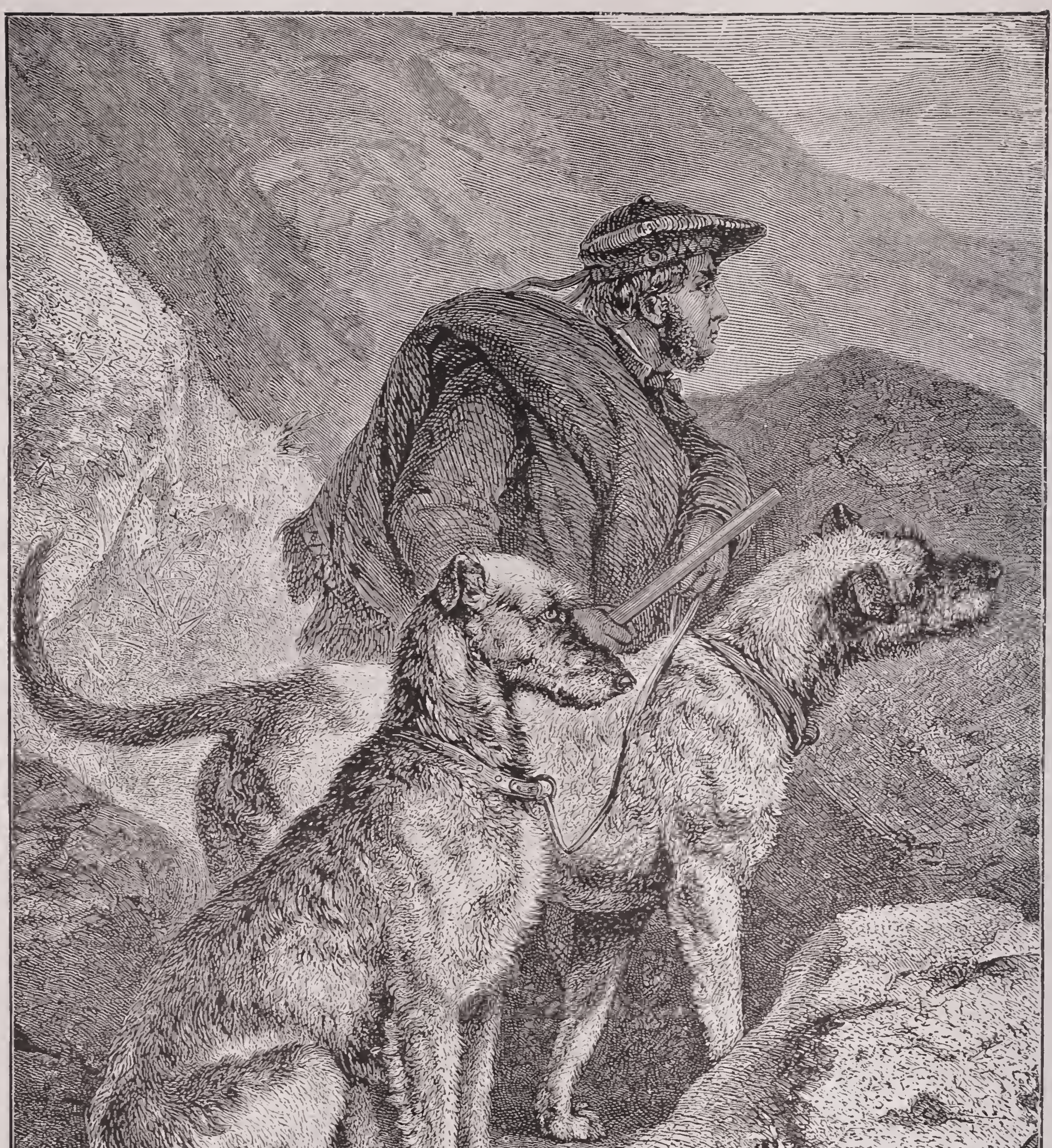

FIG. 13.—SCOTCH DEERHOUNDS.

susceptible of being educated to a wonderfully high standard as a companion of man. Always be sure and let the animal know what you want of him, and you will seldom have occasion to punish him.

There is but little more that can be said in a work of this kind on the subject. Dogs differ so widely in disposition that no cast-iron rules can be laid down for training, which will not leave a great deal for the judgment of the trainer to suggest. Kindness, firmness, perseverance and common sense will all be necessary for success.

DISEASES. It is important to know at the outset that the normal temperature of the dog is about the same as that of man, namely, 99° Fahrenheit; and that the pulse of a dog in health varies from 100 to 120 beats to the minute, according to variety, the smaller dogs having the higher rate. The pulse is easily examined by laying a hand over the region of the heart or by a little pressure upon those parts of the legs where arteries come near the surface, say just above the knees. If the animal in a perfect state of repose has a higher rate of pulsation than above stated, he has internal inflammation or a fever. As the attack becomes more violent the symptoms increase in number and violence, and the creature will have reddened eyes, hot nose, coated tongue, want of appetite, listlessness, indisposition to play or to respond to the sallies of friends. In simple fever the tongue loses its rose color and becomes coated, the gums and throat will also show corresponding changes. If the tongue be much furred, with red edges, and there is a constant thirst for water in small but frequent quantities, inflammation of the stomach or bowels may be suspected. If the tongue remains brown and streaked, with less action of the pulse, variable appetite and decrease of pain, derangement of the liver may be apprehended. If, in connection with some or all of the above symptoms, the breathing be labored and painful, with a disposition to remain in the erect or sitting position, with great anxiety and general distress, he perhaps has an affection of the lungs. Thus, if the cause of the trouble is not obvious, like a wound, for example, we must look carefully into the case, ferret out the cause and conditions as closely as possible,

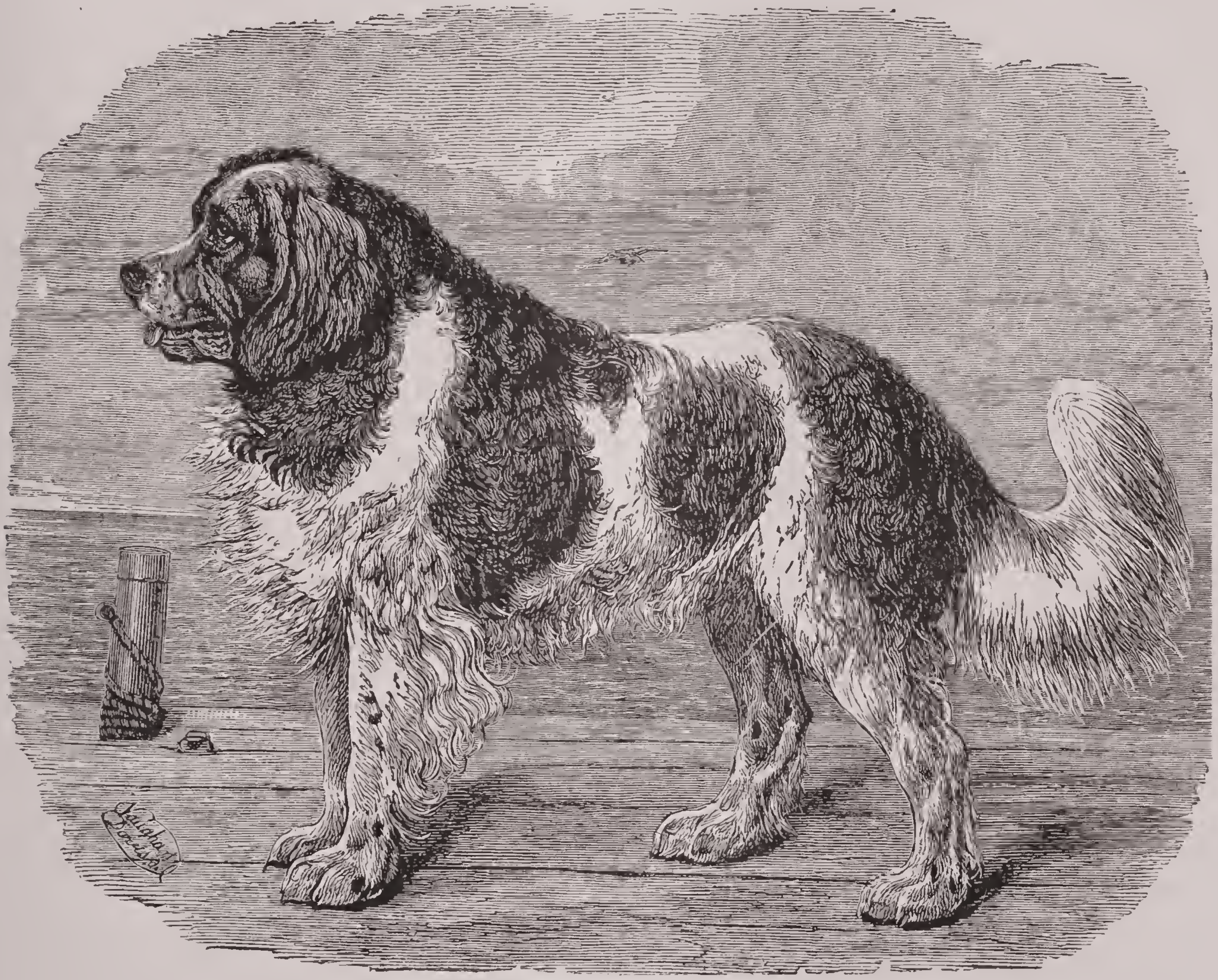

FIG. 14.—*Landseer Newfoundland.*

so that we will not be groping in the dark in our treatment of the patient. Symptoms and diseases in the lower animals are scarcely different from those in man, only most of the brute animals are not subject to so many varieties of disease. The treatment of disease among the inferior animals is also the same, as nearly as practicable.

It is much wiser, of course, to avoid sickness as far as possible by right living. A dog should never be starved; he should not be compelled to live too much on unnatural food, or on filthy food, which, by the way, in also unnatural; he should not be compelled to stay our in intense cold continuously without a comfortable place for retreat and rest when he wishes it; and his bed, too, should be frequently renewed with fresh material. Madness is by some thought to be due to intense cold, or sleeping in a filthy place or eating decayed flesh. The latter material is very apt to have poison points developed in it, which constitute virulent sources of disease.

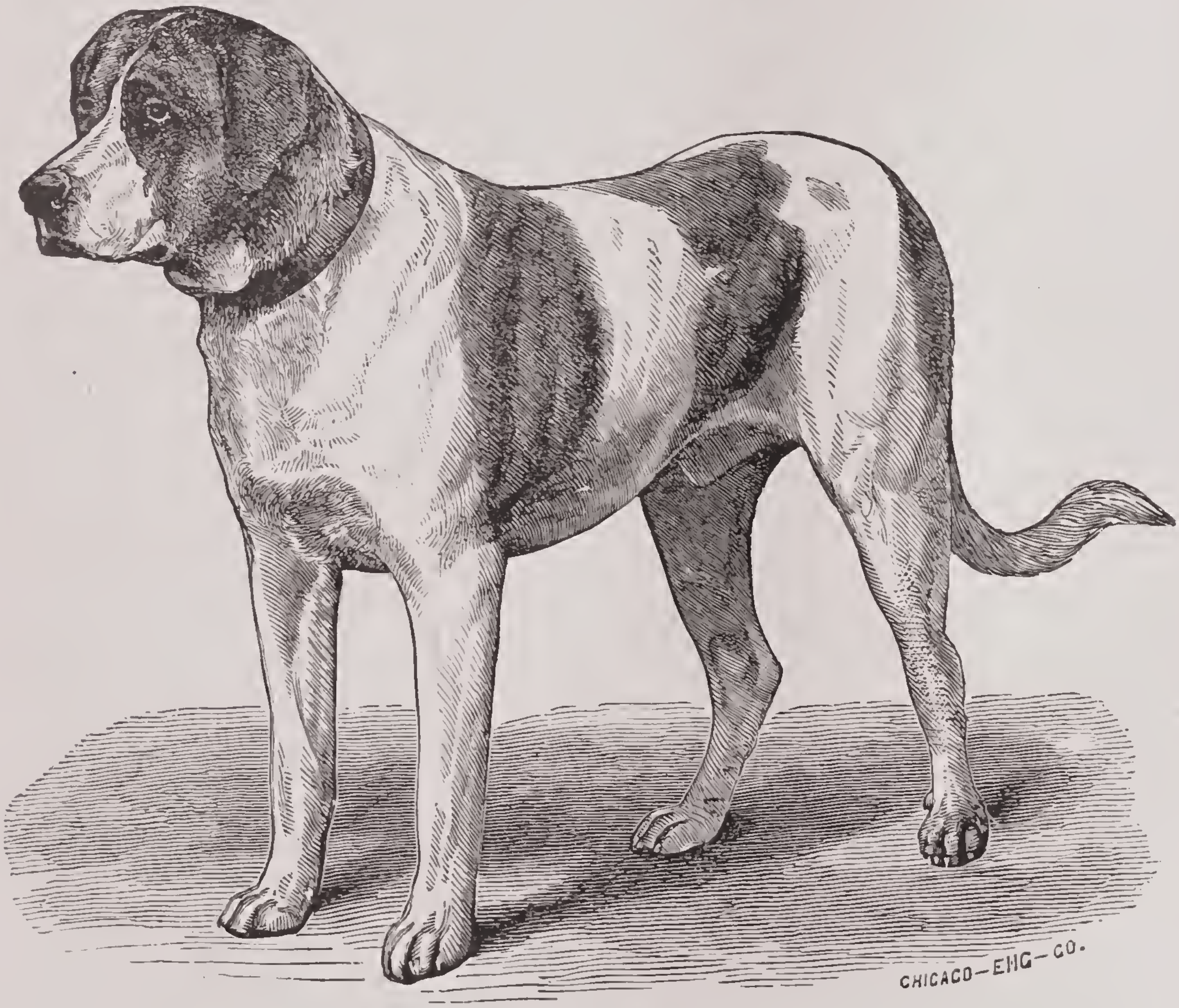
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FIG. 15.—*The Mastiff.*

ASTHMA. Dogs, especially old ones, that are shut up in damp cellars and deprived of pure air and exercise, are frequently attacked with asthma. Endeavor to ascertain the cause and remove it. Let the patient take exercise in the open air. Let his diet consist of cooked vegetables, with perhaps a small quantity of boiled meat. Raw meat should not be given.

Treatment: Take 1 teaspoonful each of powdered bloodroot, powdered lobelia, marsh mallows, and licorice; mix and divide into twelve parts, and give one night and morning. If it produces retching, reduce the quantity of lobelia, as the object is not vomiting but relaxation of the muscular system of the air passages.

BOWELS, INFLAMMATION OF THE. Evinced by indisposition of the dog to move about, and signs of acute pain when the bowels are pressed by one's hand; indeed, he always gives signs of suffering when he is moved.

Treatment: For allaying the irritation of the bowels and reducing the inflammation there, take pleurisy root 1 teaspoonful, marsh mallow root 1 tablespoonful, mix and divide into three parts, one to be given every four hours. Should vomiting be a predominating symptom, give a small quantity of saleratus dissolved in spearmint tea. If this fail, make a fomentation of hops and apply it to the abdomen, and give half an ounce of manna. The only articles of food and drink should consist of barley gruel and mush; if, however, the dog betrays great heat, thirst, panting and restlessness, a little cream of tartar may be added to the gruel. The bath and clysters (injections) may be repeated if occasion suggests. Or, put the animal into a warm bath, and rub his belly gently while in the bath, and foment it well; the drink should consist of warm broth or warm milk and water; use warm water injections for hardened fæces; the presence of these is ascertained by the insertion of a finger; after the symptoms have abated somewhat, give castor oil, syrup of buckthorn, and the spirit of white poppies, etc. Or, put the dog into a warm bath for five minutes; take out and rub the surface dry, but rub gently, as the part is very painful; then inject into the bowels 4 ounces of linseed oil mixed with a gallon of water.

DISTEMPER. The symptoms are loss of appetite, dullness, watery discharge from the eyes and nose, followed by general debility, especially in the hinder extremities; the excretions from the bowels are morbid, sometimes constipated; the urine may be high-

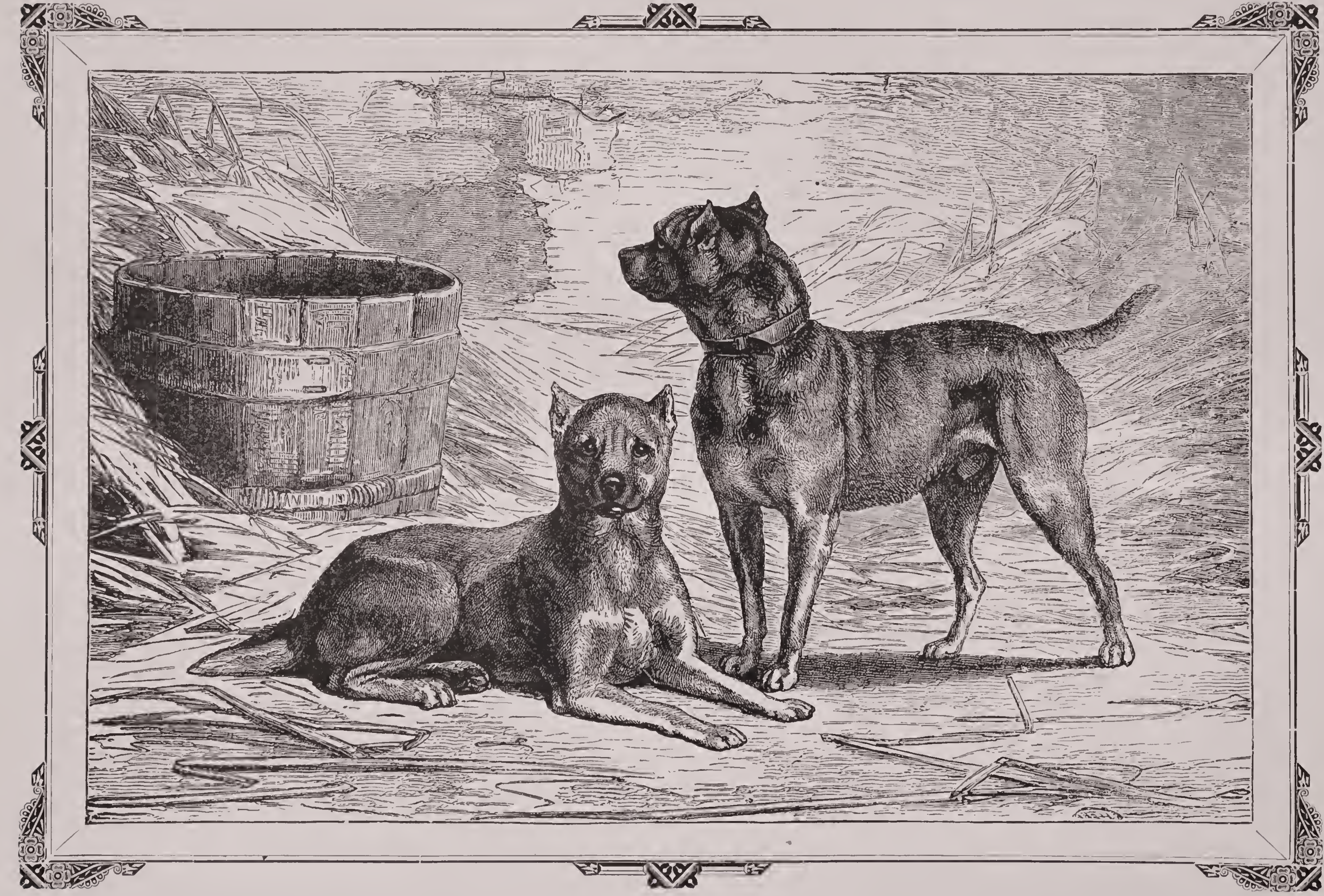

Fig. 16.—BULL TERRIERS

colored; sometimes there is diarrhœa, accompanied by scantiness of urine and vomiting; sometimes even fits are brought on by the progress of the disease.

Treatment: First give an emetic. The three general methods for this purpose are, according to the various schools of practice, calomel and tartar emetic; 1 teaspoonful of powdered lobelia in a gill of warm water, administered at one dose; salt and warm water; warm water alone. The last is preferable, of course, if effectual, and it is safest to try it first, as no harm is admitted to be done by any school of practitioners. If the first dose is not effectual, repeat it, and accompany the treatment by severely pressing and kneading the stomach of the dog externally. After thorough vomiting is induced, the animal ought to recover in a few days; but if he does not, further treatment consists in the administration of antimonial powder, nitre, and digitalis, in proportion of half a grain to a whole grain of digitalis, 2 to 5 grains of the powder, and 3 to 8 scruples of nitre, to be administered twice or thrice a day; or, powdered mandrake, 1 tablespoonful; powdered charcoal, 2 teaspoonfuls, mixed with 1 tablespoonful of powdered marsh mallows, divided into 6 parts and administered 1 part for a dose, in honey, night and morning for the first day; afterward one powder daily will suffice; the diet to consist of mush, together with a drink of thin arrowroot. If his strength fails, give beef-tea, and should diarrhœa persist, give a drink of hardhack tea.

Dropsy. This is generally preceded by loss of appetite, cough, diminution of urine, and costiveness; the abdomen shortly afterward begins to enlarge. The disease is generally fatal, but sometimes relief is obtained by puncturing the abdomen and pressure upon it to force out the superabundant water. The general health must be carefully looked after.

Treatment: A course of iodine or potassium nitrate; or, mix ¼ ounce of powdered flag-root; powdered male fern, the same quantity, with a teaspoonful of scraped horse-radish; divide into 8 parts, and give 1 night and morning. Good, nutritious diet should be allowed.

Ear, Diseases of the. The afflicted dog will show that he has some ailment in the ear by holding his head to one side, or by frequently putting his paw up to it. If canker or polypus is discovered and can be reached, apply nitrate of silver. For abscess, in the early stages, foment the part twice a day with an infusion of marsh mallows; as soon as the abscess breaks, wash with an infusion of raspberry leaves, and if a watery discharge continues, wash with an infusion of white oak bark. For ulceration wash twice a day with 2 ounces of pyroligneous acid mixed with eight ounces of water, and after a healthy appearance of the part is assumed, touch with a tincture of gum catechu. For ordinary soreness of the ears, apply marsh-mallow ointment or slippery-elm poultice, or make a constant application of wet cloths.

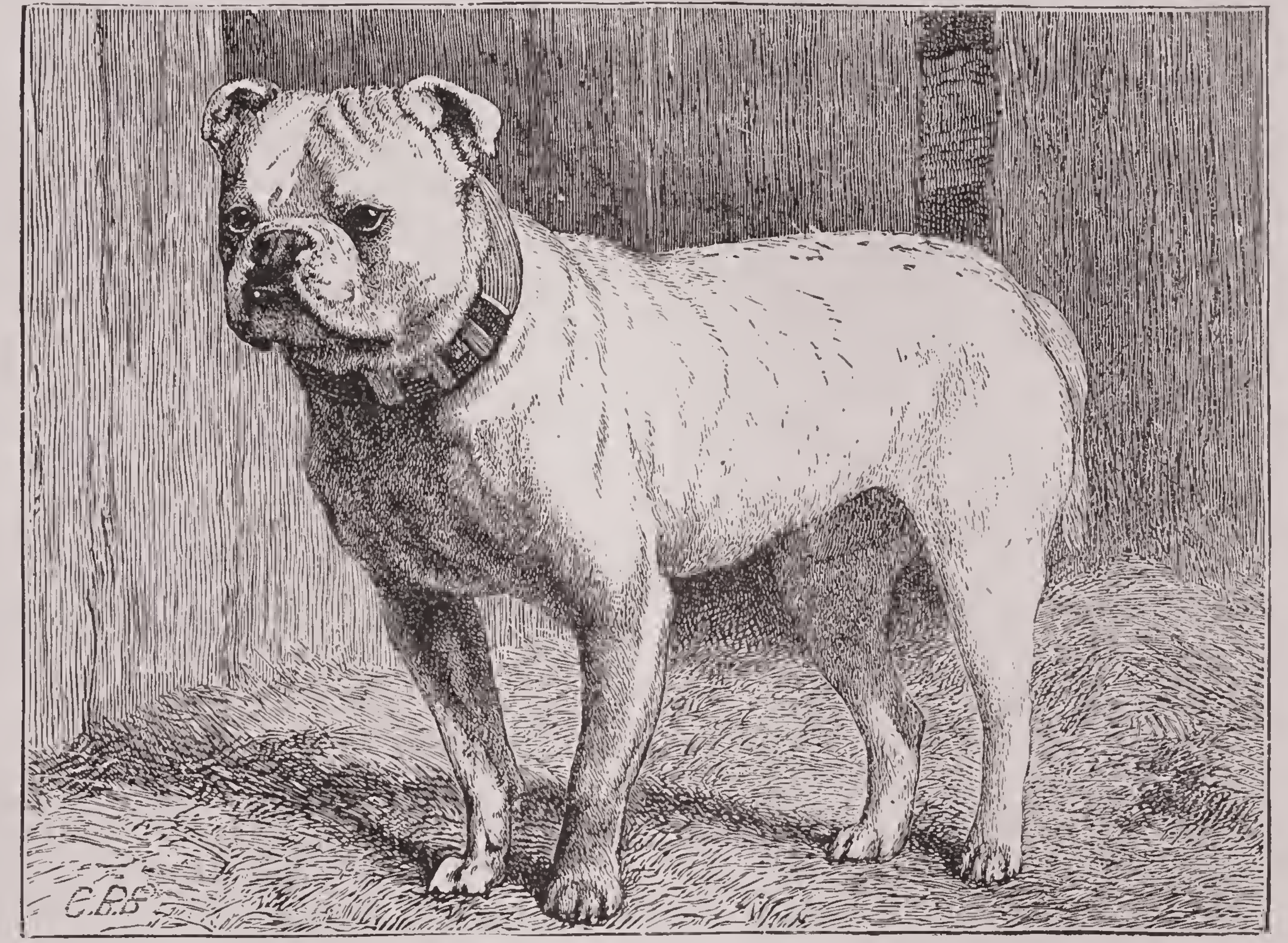

Fig. 17.—*Bull Dog.*

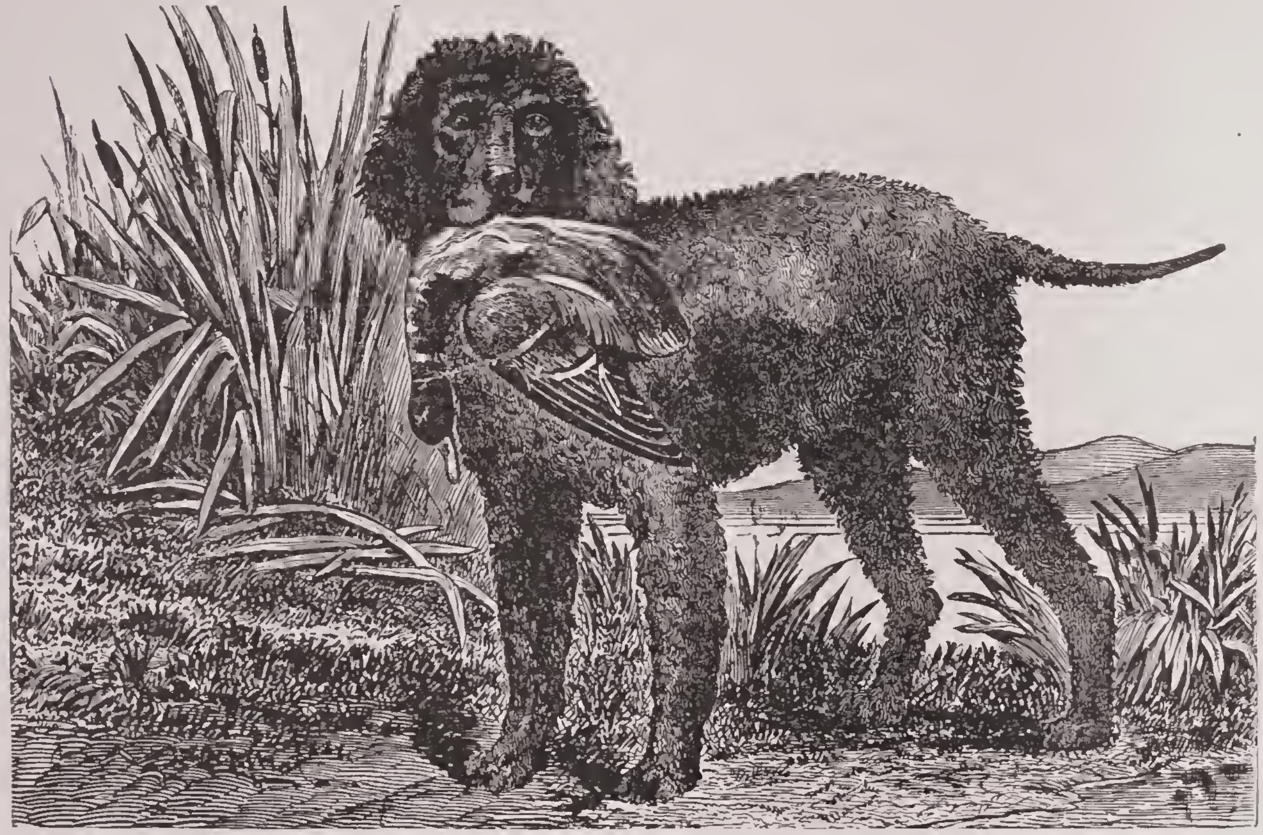

Fig. 18.—*Irish Water Spaniel.*

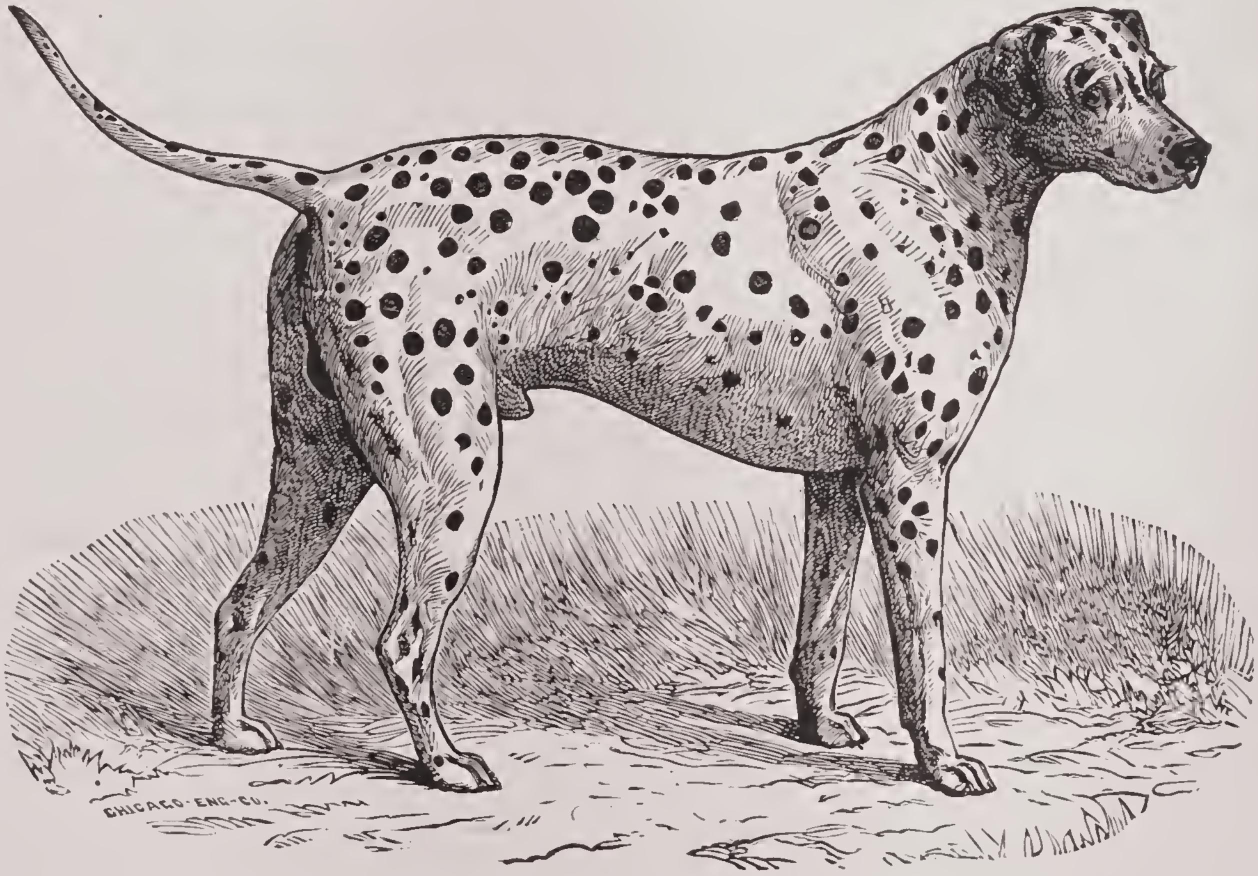
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Fig. 19.—*Dalmatian or Coach Dog.*

Weak Eyes. It often happens that, after an acute attack, the eyes are left in a weak state, and water runs from them. Wash them night and morning with pure, cold water, and improve the general health by the administration of the following: 1 ounce of manna; 1 teaspoonful of powdered gentian, and ½ teaspoonful of powdered mandrake; rub together in a mortar, and give a pill every night about the size of a hazelnut. When the manna is dry use a little honey to amalgamate the mass.

Sore Eyes. Take a teaspoonful of finely pulverized marshmallow root, add hot water enough to make a thin mucilage, and with this wash the eye frequently. Keep the patient in a dark place and on a light diet, and if the eye is very red and tender, give a pill composed of 20 grains of extract of butternut and ten grains of cream of tartar. He should be kept clean with frequent bathing in warm water, and kept in a dark place and on his accustomed diet. For purulent discharge some advise, bathe the eye with infusion of chamomile or red rose leaves, and give the following: Powdered pleurisy root, powdered bloodroot, powdered sulphur, of equal parts; dose, ½ tablespoonful daily, given in honey. When the eyelids adhere together wash with warm milk.

Sore Feet. The cause and character of the affection will generally indicate the course to be pursued. Where pus is collected, apply the sharp knife or lancet and let it out, and wash the parts thoroughly with clean water. Do not put on any kind of drugged material, as salt, lye, urine, etc., but only softening poultices, as of slippery elm, etc. Do not cause the dog to be on his feet any more than is unavoidable. For a sprain, absolute rest with frequent warm baths are necessary. For soreness between the claws, apply a poultice composed of equal parts of marsh mallows and charcoal for a few days, then wash twice a day with pyroligneous acid, 1 ounce of it to 6

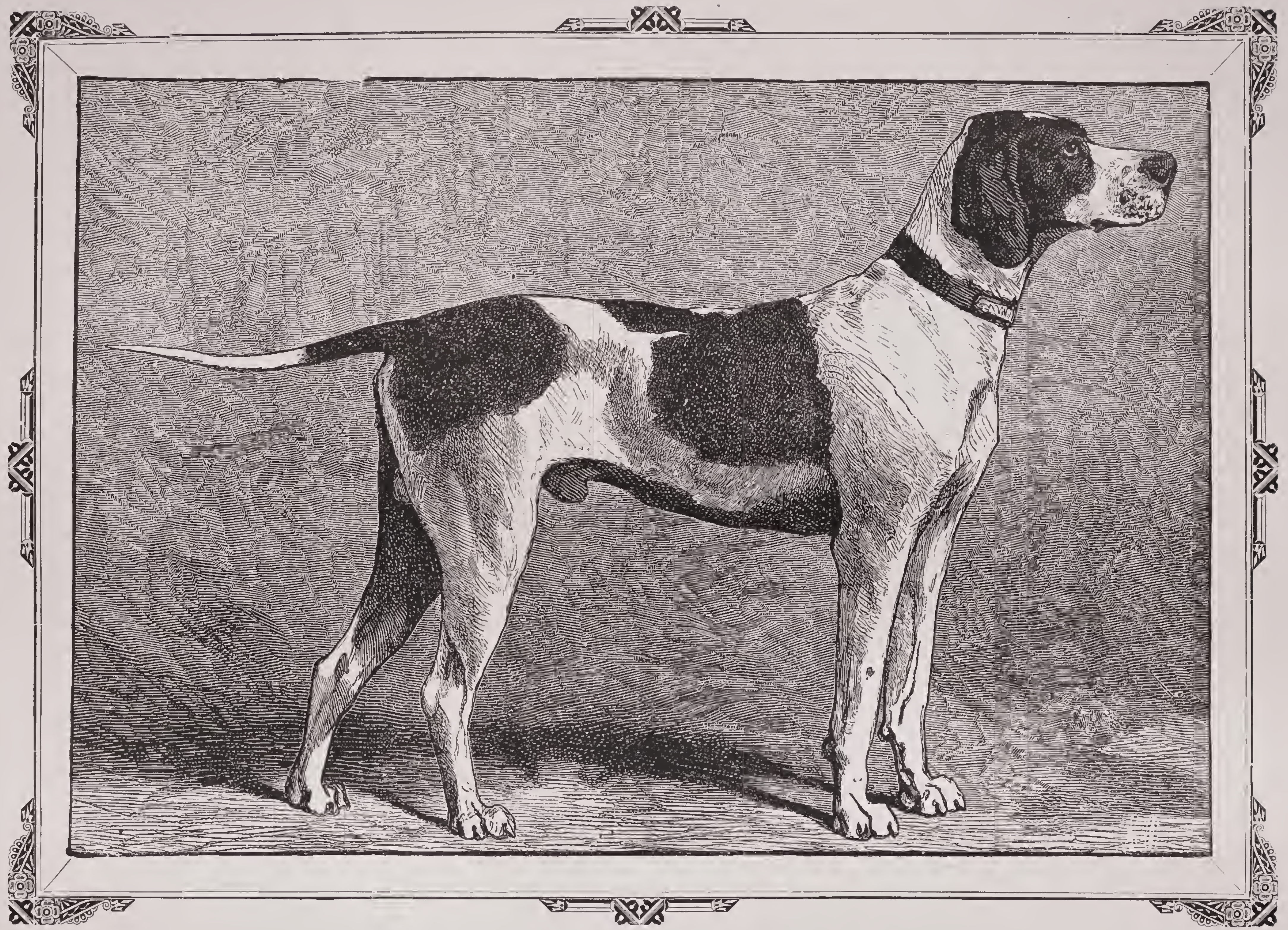

Fig. 20.—GERMAN POINTER.

ounces of water; or with carbolic acid solution.

Fits. These in the dog are of the epileptic character, and attack the animal in all ages and apparently in nearly all conditions, sometimes even in the chase. As the specific cause is obscure, we can only treat for the convulsion itself, thus: Take extracts of gentian and quassia equal parts, and of 5 grains of each make 2 pills, and give one pill in the morning and one in the evening; or, administered in the same proportions and in the same way, powdered columbo and carbonate of iron. A seton in the back of the head will aid in preventing attacks; also blisters and friction to the spine are serviceable. Or, every 4 hours give a wine-glassful of mullein infusion, and keep the animal on a vegetable diet; for constipation of bowels, give 30 grains of extract of butternut, or an infusion of senna and manna with a few caraways added. Hygienic: Plunge the patient into a tub of warm water and give an injection of the same, to which a teaspoonful of salt may be added. Give no medicine during the fit, but afterward, some advise to give a teaspoonful of manna with ½ teaspoonful of salt, with water.

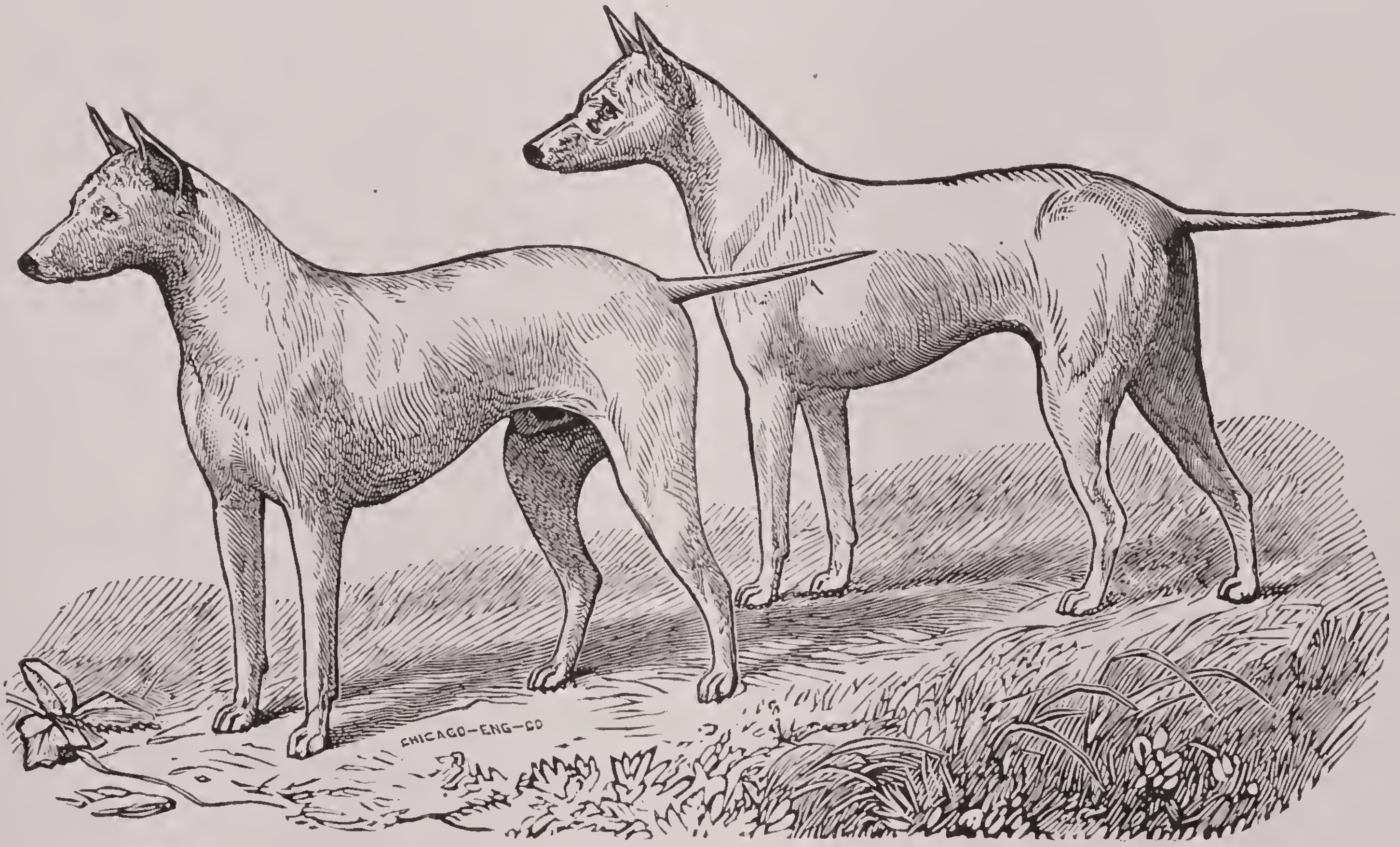

Fig. 21.—*White English Terriers.*

Fleas and Vermin. Bathe with an infusion of lobelia for 2 successive mornings, and afterward wash with water and Castile soap. Or, occasionally wash with carbolized soap, which may be obtained at almost any drug store. Remove and burn old bedding, and sprinkle the floor of the sleeping place or kennel with a solution of 1 ounce of carbolic acid in a quart of water.

Madness, Rabies or Hydrophobia. The usual remedy is powder and lead from a gun, and probably in a majority of cases it is the best; but for sincere medical treatment the following seems to be the most effectual, so far as discovered: Whenever a dog is bitten by another supposed to be mad, he should be confined until certainties are developed, so that no risk shall be run in endangering the safety of persons and other animals. The first symptoms are, a slight failure of the appetite and a disposition to quarrel with other dogs; then a total loss of appetite; he will not yelp on being struck, or show any sign of fear on being threatened; in the height of the disorder he will bite any other animal or a person; when not provoked he usually attacks only such as come in his way; eyes do not look red or fierce, but dull, and have a peculiar appearance not easy to describe. Mad dogs seldom bark, but occasionally utter a most dismal and plaintive howl. They do not froth at the mouth, but their lips and tongue are dry and foul, or slimy. They cannot swallow water, but the idea that the sight of water always throws them into convulsions is false. Now, as to the treatment: Take 1 ounce of sulphur, 2 ounces of lobelia and several gallons of boiling water in a wash-tub; as soon as it is sufficiently cool, plunge the dog into it and let him remain several minutes; then give an infusion of either yellow broom, plantain or Greek valerian,—1 ounce of herb to a pint of water. An occasional teaspoonful of the powdered plantain may be allowed with the food, which must be entirely vegetable. Wash the wound with a strong infusion of lobelia, and bind some of the herb upon the part. Continue this treatment for several days, or until the dog recovers and all danger is past.

Mange. This is a scabby disease of the skin, in which the regular itch mite is often found. Sometimes the large blotches appear, from which the hair falls and leaves the skin bare and rough; sometimes the disease appears much like an attack of erysipelas, and sometimes there is considerable inflammation, and even ulceration. Treatment: Aperient and cooling medicines, and applications of subacetate of lead or spermaceti ointment. When other things fail, a weak infusion of tobacco may be carefully resorted to. Mercurial ointment may be used, taking care that the dog does not lick it; also, mild purgatives, especially Epsom salts, are often beneficial, and also mercurial alteratives, as Æthiops mineral with cream of tartar and nitre. Or, apply an ointment of soft soap worked up with ½ a table spoonful of powdered charcoal and 1 ounce of sulphur, one-third of this each day for 3 days, and then wash the dog thoroughly with Castile soap and warm water, and wipe dry. Internally, give daily ½ teaspoonful of equal parts of sulphur and cream of tartar, in honey; when the disease becomes obstinate, and large, scabby eruptions appear on various parts of the body, take pyroligneous acid, 2 ounces to 1 pint of water, and wash the parts daily. Keep the animal on a light diet.

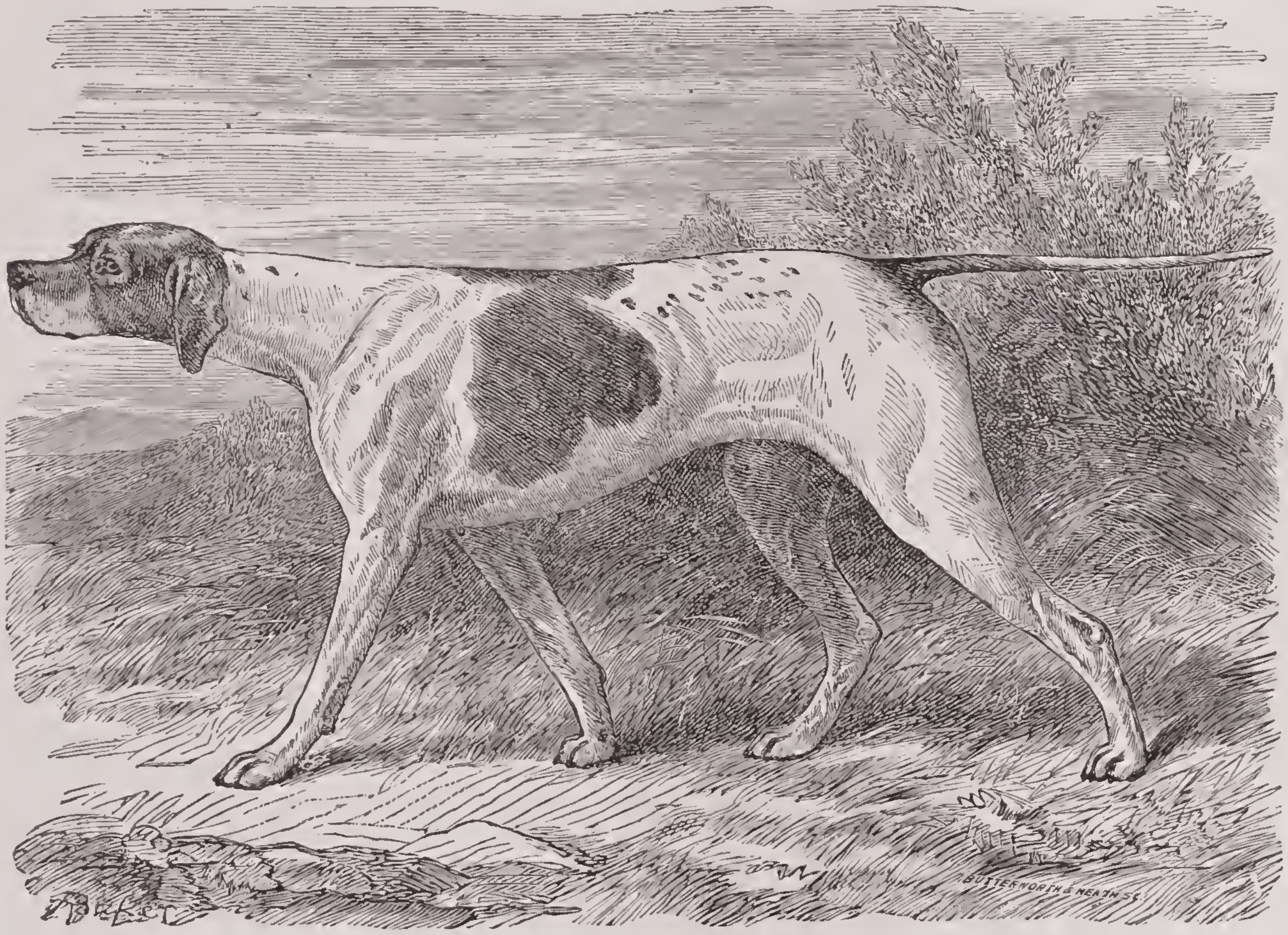

Fig. 22.—*English Pointer.*

Piles. These are generally produced by confinement, over-feeding, fine-flour bread and sweet cakes, etc. They are shown by a red, sore and protruded rectum. Treatment: Give a half teaspoonful of sulphur for 2 or 3 mornings, and wash the parts with an infusion of white-oak bark. If they are very painful, wash 2 or 3 times a day with an infusion of hops, and keep the animal on a light diet, or plenty of that food which is most natural to dogs.

Scalds. When a dog is accidentally scalded by hot water, apply lime-water and linseed oil as soon as possible. Hygienic: Apply cold water, and in severe cases, when a malignant sore results, apply emoillent (softening) poultices.

Sore Throat. A strong decoction of mullein leaves is said to cure almost without fail. Hygienic: Fomentations of the part, and in severe cases no food, but plenty of drink should be allowed, for a day or two.

Worms. These proceed from debilitated digestive organs; hence tonics are indicated as preventives, which consist, according to ordinary health laws, of the strictest fresh food, rather scantily given for a few days, then with an increase of quantity and variety, but always short of cloying the animal; according to most other systems, bark bitters. For immediate expulsion of the worms, take oil of wormseed 1 teaspoonful and powdered asafœtida 30 grains, and give every morning before the patient has had his breakfast; two doses will generally suffice. Or, take of powdered mandrake ½ tablespoonful, of Virginia snakeroot 1 teaspoonful, and divide into 4 doses, giving 1 every night in honey; or give an occasional drink, followed by an injection, of an infusion of sweet fern; or, ½ tablespoonful of powdered golden seal rubbed up with an ounce of common brown soap, and made into pills the size of a hazelnut, 1 to be given every night.

Wounds. When fresh, bind up with adhesive plaster and watch for inflammation, which reduce with warm water. In old wounds the decayed flesh should be eaten out with silver nitrate, and if the place is then raw, apply a poultice of linseed meal or Turlington's balsam. When a dog is bitten by one that is mad, give him a teaspoonful of lobelia in warm water, and bind some of the same upon the wound.

How to Give Medicine. The administration of medicine is often a troublesome process with canine patients; the usually affectionate, obedient, and harmless pet becomes (through fear and mental excitement) snappish and resistful, and a general complaint the veterinary attendant hears is, "It's no use, sir; we can't give him the medicine; the more we try, the more he struggles, fights and bites." This in the majority of cases is so, the reason for which is that, as a rule, strength versus system is the plan adopted. As with ourselves, so with the dog: there is a right and a wrong way in the taking or administering of medicine. The medicine is in the form of a pill or draught. The former may be given one or two ways; first by taking the animal in the lap, or rearing him up between the knees; the upper part of the mouth is then grasped with the hand, and the lips on either side thrust between the teeth. Security against the operator being bitten is gained by the dog being afraid of biting himself. The head is then elevated, the pill is dropped into the posterior part of the mouth, and the jaws immediately closed and held so; and if the animal refuse to swallow it, placing the fingers on compressing the nostrils will speedily compel him to do so. Pushing the pill down with the finger is injurious and unnecessary. The other and more advisable way, if it can be contrived, is by deception, that is, closing the pill in a little meat and throwing it to the animal to bolt. With regard to draughts, they should be administered as follows: The animal being placed in the same position as for the pill, the angle of the mouth is drawn down away from the teeth, and into the pouch thus formed the medicine may be poured; the same means as recommended in the former will, if he refuses, compel him to swallow it. Some forms of medicine, more or less tasteless from minuteness of the dose, may be given in a little milk or broth which the animal laps voluntarily.

Care and Management of Dogs. *Food.* How much evil accrues from the want of a proper system and, in many cases, knowledge of administering food and of the kind requisite, it is impossible to say. That many of the diseases to which the canine species are subject, and especially of the digestive organs, are due to ignorance and neglect of this subject, is no exaggeration.

The organization of the dog is peculiar; his digestive powers are undoubtedly great, but the process by which digestion is accomplished is slow. Hence, he does not require more than one, or, if in full exercise and work, not more than two meals per day. The food should be plain, wholesome, nutritious, and, as far as possible, compatible with the circumstances under which the animal exists.

Sugar, buttered bread, hot toast, muffin, preserves, fancy biscuits, tea, sweetmeats, and such like, are items never intended to enter a canine bill of fare. The animal, contrary to nature's laws, has been educated to mimic human beings; three or four meals a day, exclusive of kitchen-scraps, have taken the place of the prescribed one or two, and human delicacies substituted for the proper requirements of a carnivorous stomach.

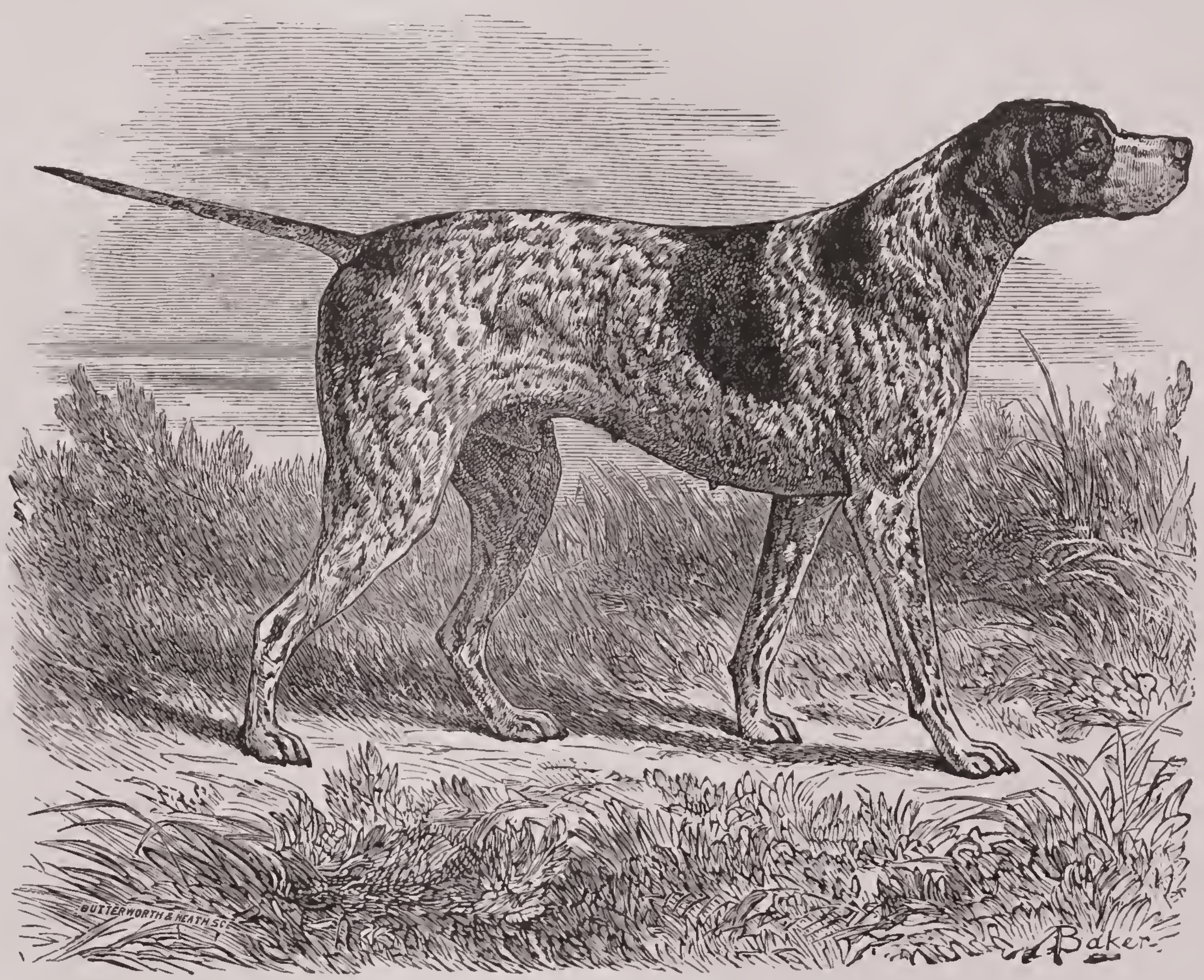

Fig. 23.—*English Pointer.*

Can it be wondered at if the whole digestive machinery is, in consequence, put out of gear; if the once glossy-coated pet of cleanly habits becomes the bloated, waddling, unsightly animal so often seen, with teeth loose, discolored, and decayed, breath foul, and excrements fœtid? And all the result of what? Ignorance and kindness.

A proper system of feeding is, therefore, one of the great essentials of canine care and management.

Time of Feeding. The food should always be given, if convenient, at a stated time; where only one meal is allowed, at mid-day; in case of two, morning and evening. It should not be given immediately before exercise or work, or the process of digestion will be interrupted and the foundation laid for ill health; but as soon as the animal comes home, has had sufficient time to rest, and becomes cool, then food may be proffered and will be relished considerably more.

Quantity. This should be exactly in proportion to the appetite, that is, until the animal is satisfied. Some individuals condemn the practice of permitting dogs to fill, or, as they call it, to overgorge themselves; and where the dogs have been previously starved or have missed a meal or two, they are right, but otherwise not so. The cravings of the carnivorous stomach are not of the frequency found in herbivorous and omnivorous ones, owing to the slow process of digestion; and this being so, a larger stock of material is required to work on than when the intervals between the meals are shorter; otherwise long fasts would result, and eventually act prejudicially to the animal's health.

When the dog, after eating for some time, pauses, looks about, leaves the dish, returns to it and makes an attempt, as it were, to get a little more down, then it should be removed. Company will frequently induce the animal, from motives of jealousy, to take more than he really wants, and he will greedily devour, on the approach of another creature, that which a few moments before was rejected. This, of course, is hurtful; it may be likened unto the surplus oil on a machine, which cannot be utilized, and is therefore wasted, and does injury to other parts; so with the dog; the surplus food may pass into the intestinal canal undigested, and produce diarrhœa or constipation.

Kind of Food. Many and various are the opinions on this point; horse-flesh, mutton, paunch, entrails, liver, greaves and oatmeal are among the list of those advocated. Flesh is, undoubtedly, the dog's natural food, but, on the other hand, we must look to the circumstances under which he is placed. For instance, toy dogs or house pets, not used for sport, do not require flesh meat beyond an occasional bone and meat gravy; bread, or plain biscuit with milk, oatmeal porridge, plain rice pudding, or potatoes and gravy, with green vegetables once or twice a week, form the most suitable diet for this class of dogs.

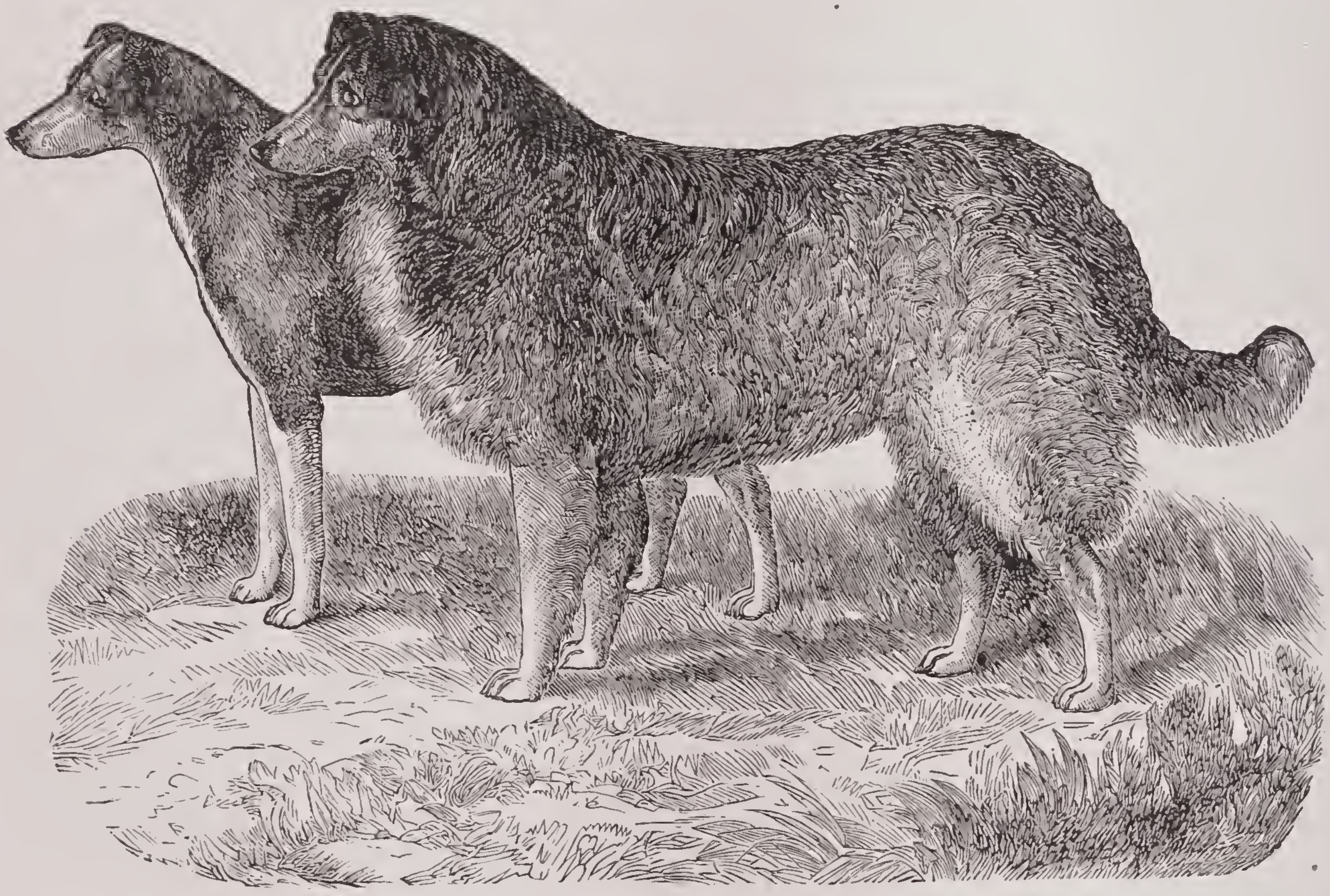
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FIG. 24.—*Scotch Colleys, or Shepherd Dogs.*

For those used in sport or kept on the chain, especially the former, flesh meat, used with discretion, is suitable. Paunches or mutton are best adapted; the former should always be thoroughly washed, otherwise worms or their larvæ are likely to be swallowed, and develop in the dog into large tape-worms; horse-flesh is heating, causes the animal to smell strong, and is a great producer of worms. Liver cooked is like so

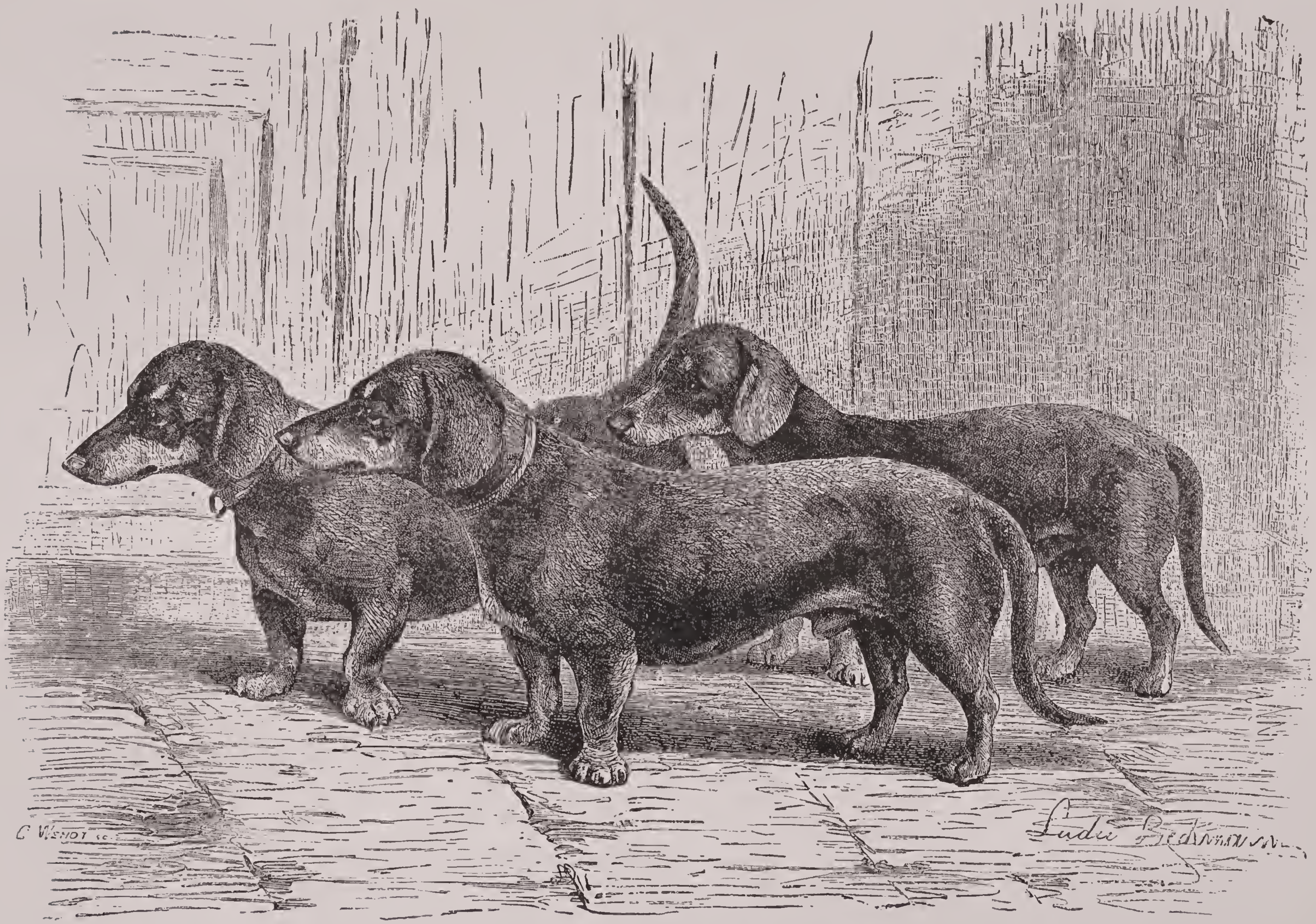

FIG. 25.—DACHSHUND, OR BADGER DOG.

much leather, indigestible and innutritious, and from its liability to flukes, which in the dog develop into tæniæ proper, is also objectionable raw. Sheep-heads, trotters, and ox-noses form a highly nutritious and valuable food, especially for invalid dogs; boiled down, they form a glutinous jelly, of which dogs are particularly fond. Whatever kind of flesh meat is used, meal should form the basis, and none is better than the coarse Scotch oatmeal.

Bones are of great value to the dog. The dog has a natural fondness for bones, independently of which they are of great value to him. One should always be allowed at least once or twice a week. They assist in cleansing the teeth and aid digestion. The animal's instinct would appear to teach him this, for however good and savory the meal may be, if there be a bone in it, he will immediately pick it out, strip it of its meat, if there be any, and store it away for after use. It is best, however, to give bones after a meal; otherwise, when hungry, they are apt to eat as much of the bone as possible, to their own injury, as portions may get lodged in the œsophagus, and give rise to asphyxia, or from being to hard to digest, cause gastric or intestinal irritation. A dog should never be induced to eat against his will except in certain diseases. Beer, wine and spirits should never be allowed, except medicinally. Some dogs are particularly fond of the former.

Water. There are few animals to which the denial of water is felt to a greater degree than the dog. Whether in health or disease, water is requisite in assisting the natural functions of the body. With regard to the feeding of puppies, when weaning, milk is undoubtedly the most suitable diet, and to this, as time goes on, may be gradually added a little bread or oatmeal porridge. Animal food (except in an occasional bone), is not advisable in any breed of young dogs, until four or five months old, and it should then be gradually, not suddenly, introduced into diet.

Exercise is equally beneficial to canine as it is to human health. The mind is diverted not only in the performance of the act but also in the novelty of fresh scenes, new faces and objects, bright weather and pure and bracing air. To the young dog it is indispensable. Compare the animal, which from a puppy has had full freedom, with one cooped up until it has arrived at maturity: in the former nature has asserted her right, and, unchecked, given symmetry, full development and health; in the latter, crooked legs, deformed body, and stunted growth, is the picture she presents of an interference with her laws.

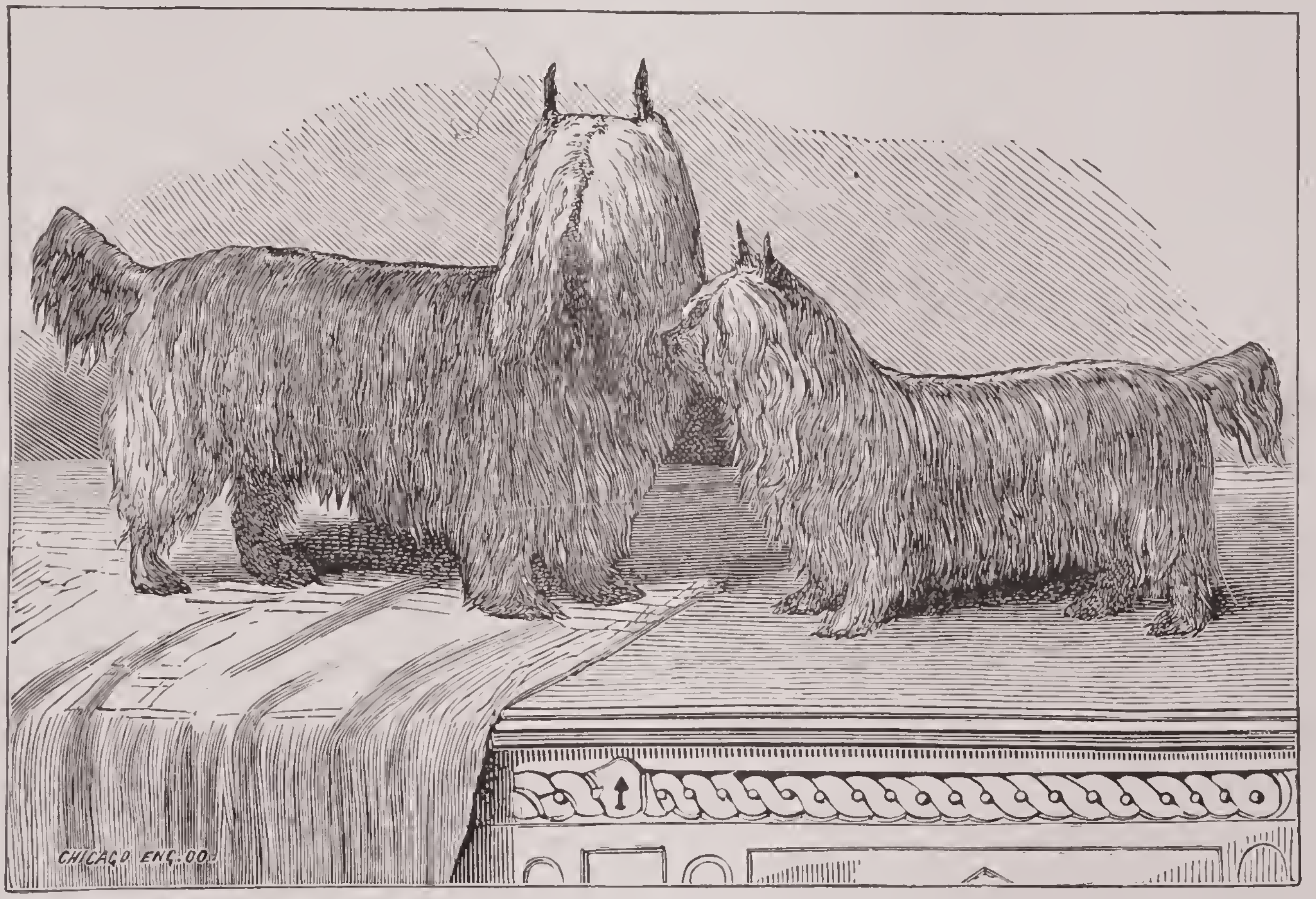
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Fig. 26.—*Yorkshire Terriers.*

Exercise should not be allowed so as to produce undue fatigue, as in carriage-followers and sporting dogs; in the latter, we are aware, it is under certain circumstances unavoidable. It should also, if possible, take place before feeding, or if impracticable not until some hours afterwards. Running or long walks on a full stomach, is liable to produce fits of the worst kind, and many a dog have we seen so affected.

Washing in moderation adds greatly to the health and comfort of the dog. Long-haired dogs require ablution more than short-haired ones, and usually have a natural inclination for water. The frequency of washing will depend to some extent on the manner in which the coat is kept; if regularly brushed and combed, once a month is quite sufficient; under any circumstances a weekly bath is more than ample. The water should be a little more than tepid, and soap used merely enough to create a lather, as its alkaline properties, if used in excess, render it an irritant to the skin (where careful rinsing is adopted the caution is almost needless). This, however, is so frequently not carried out that the soap in the process of wiping is rubbed in, and gives rise to the irritation named. When, then, thoroughly cleansed the animal should be finally douched with cold water, rubbed dry before the fire, if the weather is raw, and immediately after allowed some brisk exercise. Out-door dogs will dry themselves after their own fashion, and a good bed of straw will be sufficient to complete the toilet. In those breeds which have an inclination for water, as Newfoundlands, retrievers and spaniels, the lake, river, or canal will afford the best means of ablution.

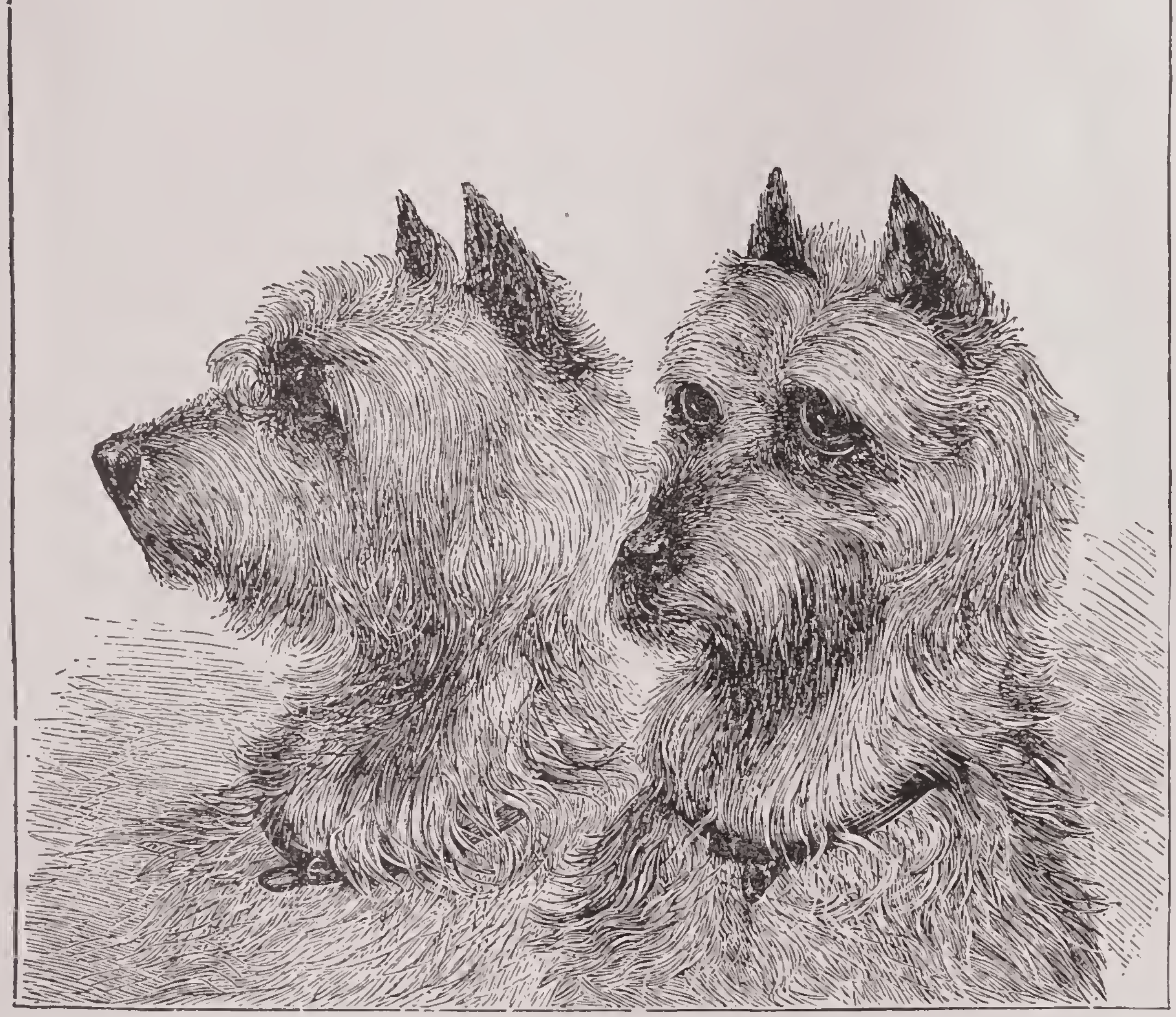

Fig. 27.—*Irish Terriers.*

Grooming is especially advisable in all dogs where fineness of coat, kindness of skin, cleanliness and health are desirable. Combing and brushing in long-haired dogs is absolutely necessary to prevent the hair matting, and to preserve its character. In large breeds, as the mastiff tribe, it is as requisite for good appearance as in the horse.

Cropping. "This is an infliction of too much torture for the gratification of a nonsensical fancy," observes Youatt; "and, after all, in the opinion of many, and of those, too, who are fondest of dogs, the animal looks far better in his natural state than when we have exercised all our cruel art upon him." Fashion, however, unfortunately, in this as many other matters relating to the lower animals, steps in and countenances what is to all intents and purposes an act of wanton cruelty. One of the great functions of the external ear is the protection of the more delicately arranged internal structures. Again, the ears are full of expression. Alarm, excitement, joy, watchfulness, are each denoted by their different attitudes.

Rounding. This may be termed cropping in another form, and unless absolutely necessary, as in the extension of cartilaginous disease in canker, it is equally to be condemned with the former. That it is a prevention of canker is purely imaginary. Such an idea is on a par with cutting off a leg to prevent its being broken. True, the part that is removed cannot become diseased; but what is left can, and is very apt to after such unwise measures.

Tailing. This also is a dictate of fashion; shortening this appendage is not necessarily a cruel operation. It should always be performed, when intended, a few days after birth, while the parts are tender and easily severed without hæmorrhage. For dividing the tail and then drawing it, a pair of the ordinary flat-nosed, sharp-edged pincers are best adapted, and avoids the other filthy habit of biting the required length off and making a foul sore.

Worming consists in removing one of the cords or tendons of the frænum, which, when removed and released from tension is in its movements said to resemble a dying worm. Ignorant people are thus imposed upon by pretenders of equal ignorance, with which barbarity is mingled. Two prevalent ideas regarding the operation are, that it is a preventive of rabies and mischievous disposition, both of which are equally absurd and erroneous.

Castration. This operation is now rarely performed upon the dog except for certain conditions of the testicles which render their removal necessary. Emasculated dogs have a great tendency to become

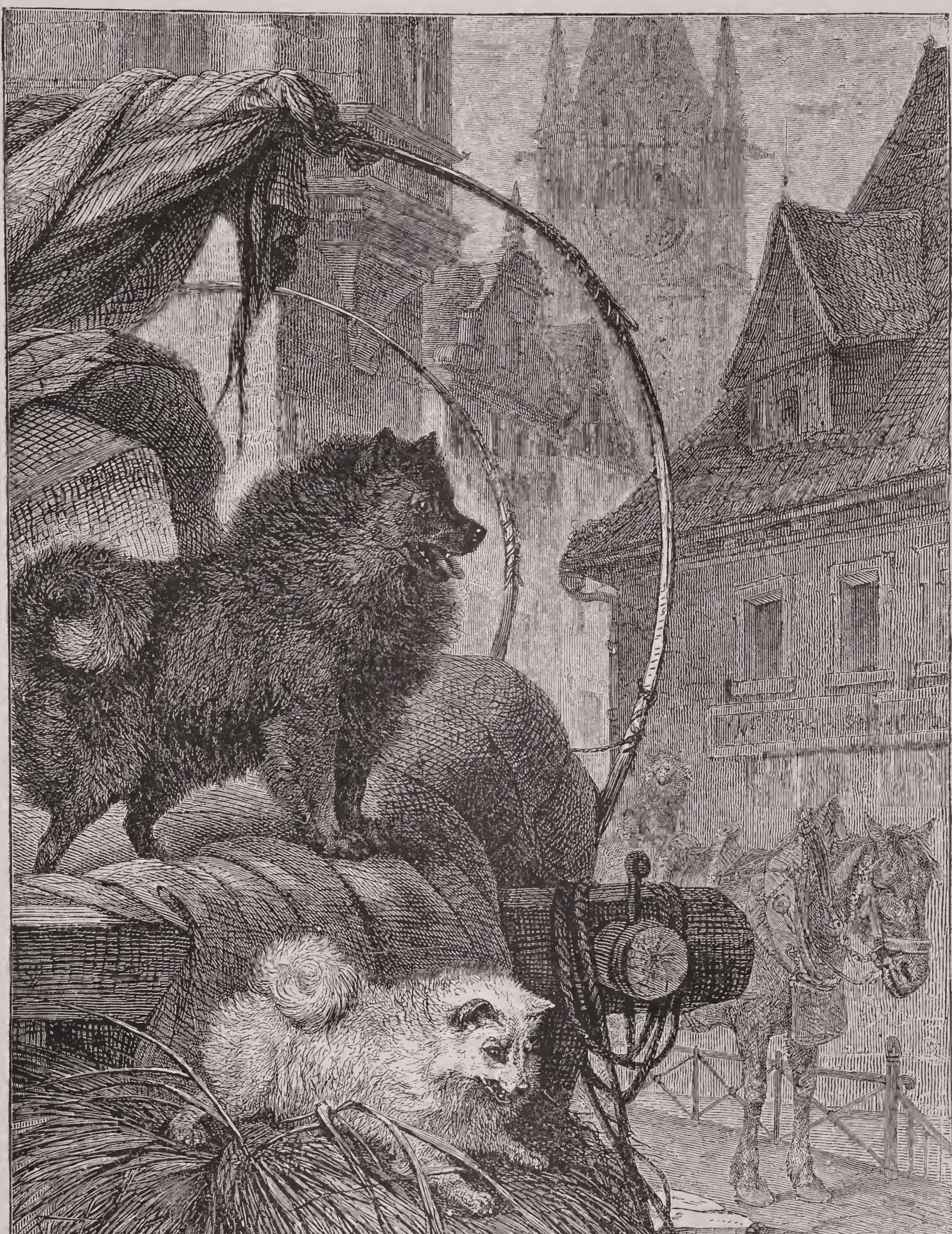

FIG. 28.—POMERANIAN OR SPITZ DOGS.

obese, idle, and so far as sports are concerned, comparatively useless. The operation, which should be performed under chloroform, is a simple one. An incision is made through the scrotum on either side of the medium line. The testicles being protruded, a thread or silk ligature is placed around the spermatic cord about an inch from the testicle, and the latter is then removed a little below the ligature with a scalpel or scissors. An aperient and warm fomentations are generally all that is necessary in after-treatment.

In all animals a loss of energy, physical strength, and acuteness of the senses, generally result from castration. It has been claimed that animals, particularly dogs, in this state, are more affectionate and faithful. Disinclination to fraternize with their own species, and more especially those of the opposite sex, is a natural consequence of emasculation, and therefore the supposed home affection and faithfulness are but the result of their abnormal state.

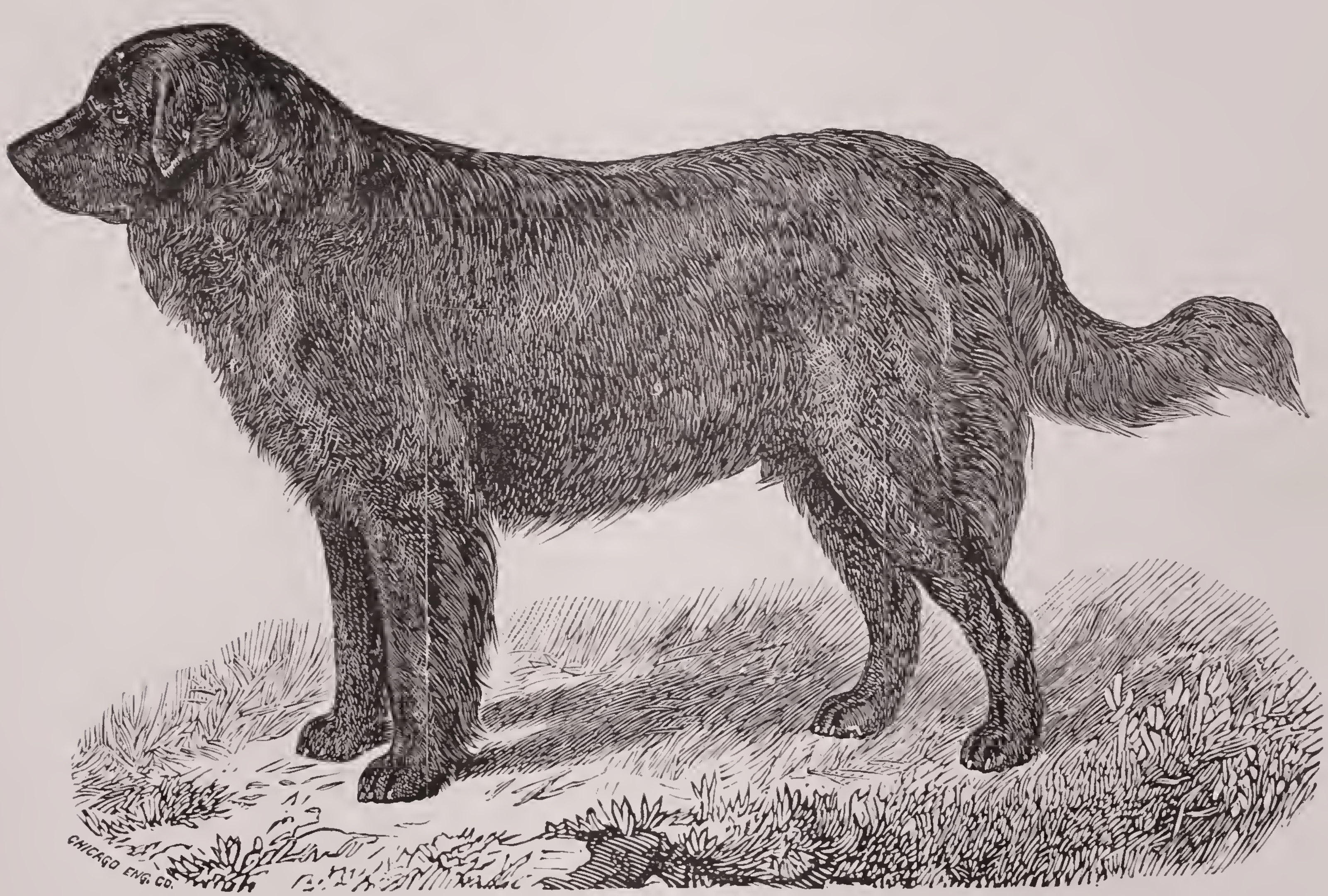
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FIG. 29.—*Newfoundland Dog*

VACCINATION is very largely adopted for the prevention of distemper. Whether beneficial or not, the operation is a harmless one; and as small-pox does occasionally attack the dog, it may sometimes be attended with good results. The places generally selected for vaccination of the dog are the back of the neck, the inside of the fore-arm, and the ears.

SPAYING, or removal of the ovaries of the bitch, is now seldom or never performed. It is both an inhuman and useless operation.

CHLOROFORM is of especial value in operations on the dog. An operation of any consequence on the larger breeds and those of a savage disposition could not be performed with any degree of safety and comfort without its use or some other anæsthetic. There are certain conditions in which its administration would be attended with risk, as in diseases of the heart and lungs. Chloroform demands the attention of those of a humane disposition, for with the knowledge that we are not inflicting pain is gained strength of nerve, confidence in ourselves, and a more successful operation.

REMOVAL OF THE DEW-CLAWS. The dew-claws or supplementary toes grow above the foot on the inside of the leg, and are apparently of but little use. Their presence, however, in sporting dogs is considered an eye-sore by some, and they are therefore often removed. This should be done when the animal is quite young. They are easily cut off at that time with a sharp pair of scissors, first dividing the skin, and the dew-claw being drawn to one side before it is detached, in order that the skin may after cover the wound.

The Kennel. With the exception of those varieties of dogs that are only designed for pets, no dog should be allowed in the house or around the stove if a due regard for his health and comfort is had; neither should he be exposed to the inclemency of the weather, any more than the more valuable domestic animals. A house or kennel should be constructed for his especial use which in style and cost may depend on the owner's fancy and pocket. The principal features of a good kennel are, warmth, airiness, cleanliness, and ample protection from wind and rain. It is a mistaken kindness to admit a dog to the house on a cold day, because he is fine-haired; the undue warmth of the house makes him tender, and renders him far more susceptible to injury from the cold when again exposed. Make his kennel warm and give him a good dry, fresh bed, and there is nothing to fear for him. The heat of a stove is injurious to the health of a dog, and a thin-haired pointer may be raised from puppyhood, in a good kennel, without either discomfort or injury from cold.

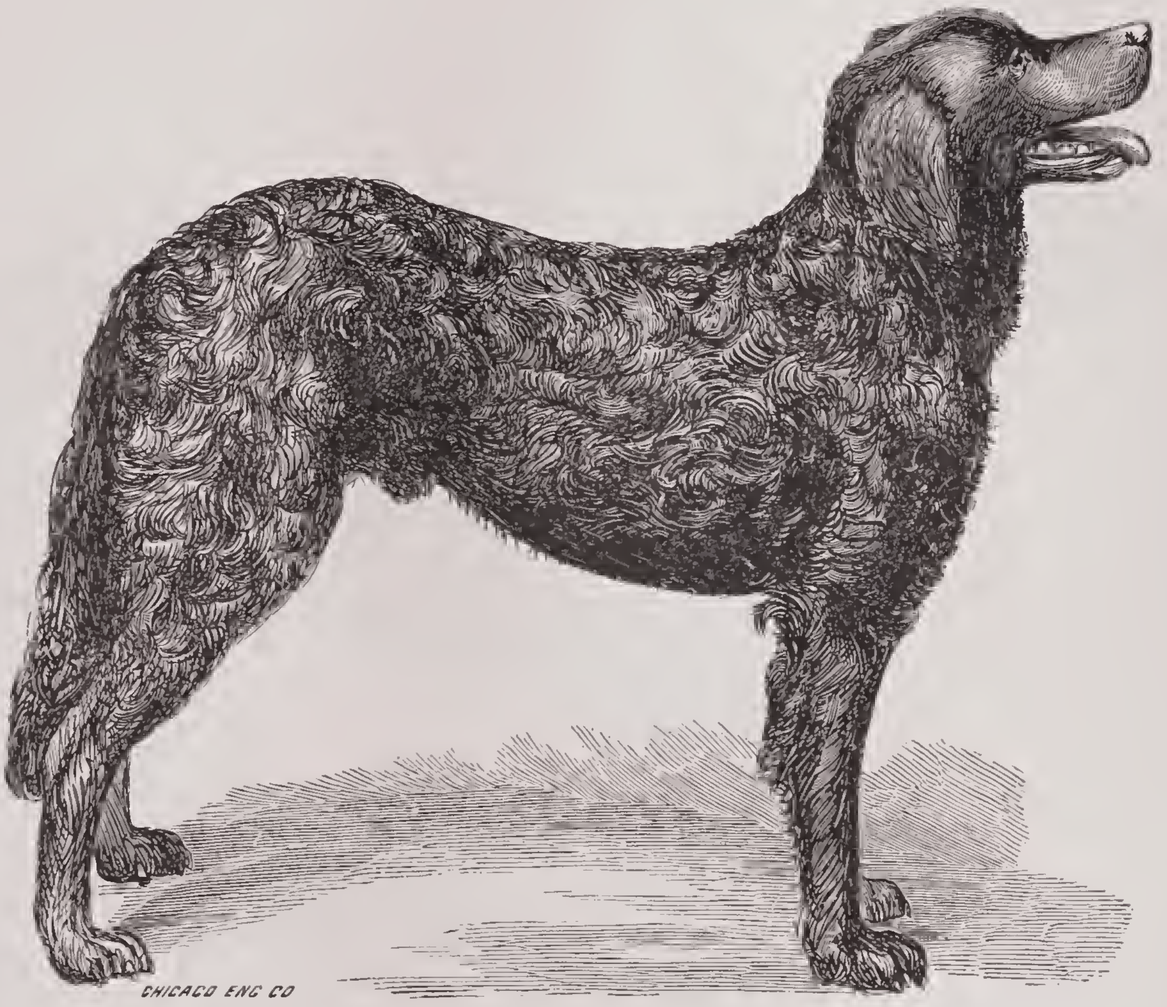


Fig. 30.—*Chesapeake Bay Dog.*

Dog Days. This name is applied to the period between July 24 and August 24, because the dog-star (Sirius) during this period rises with the sun. The heat which is usually most oppressive at this period was formerly ascribed to the conjunction of this star with the sun.

Domestic Economy, or household science, includes all the arts pertaining to the management of home affairs, intellectual, moral and material; but the terms are often restricted to kitchen, laundry and chamber work. A large portion of this encyclopedia is devoted to domestic economy, and therefore, to consult it concerning any point within the domain of the household, the reader should look for the particular topic in its alphabetical place. There are a few general principles, however, which come more appropriately under this head than elsewhere, and we therefore present them here.

Preservation of Food. Every housekeeper should know how to best preserve food. Not only should they know how to cure meats by salting, smoking, etc., but they should know how to preserve them fresh as long as possible. The temperature and dryness of the atmosphere are important considerations, and their effects should be understood in all attempts at retarding decomposition. A certain degree of heat will hasten decomposition, while a higher one will arrest it. Cold, according to its degree, must retard or utterly prevent decay. The good housekeeper never throws away even crumbs of bread, but saves them for puddings; she bakes all the dough mixed, leaving none to sour, and bakes when and as it should be, thus avoiding heavy bread and funereal pastry; in boiling her meat, she skims off the fat for cooking purposes; she saves every scrap of cooked meat for hash or soup; she never wastes flour in sifting; she uses vegetables while they are fresh instead of first allowing them to wilt or spoil; she saves everything that can be warmed over for the next meal; she has appropriate dish cloths, and washing and wiping cloths for each class of articles; she has pot-scrapers, metallic and wooden, and griddle and pot holders, and uses them; she removes the bar of soap from the water after using it, and puts bits of soap into a dish to be changed into soft soap by a little boiling, when enough has accumulated; she washes the scrub-brush after using and hangs it up; she seldom spoils the stoves or stoveware by too hot a fire, nor allows her tinware, pots, kettles, knives, forks, etc., to rust by leaving them wet; she never uses good knives in cooking or scrap-

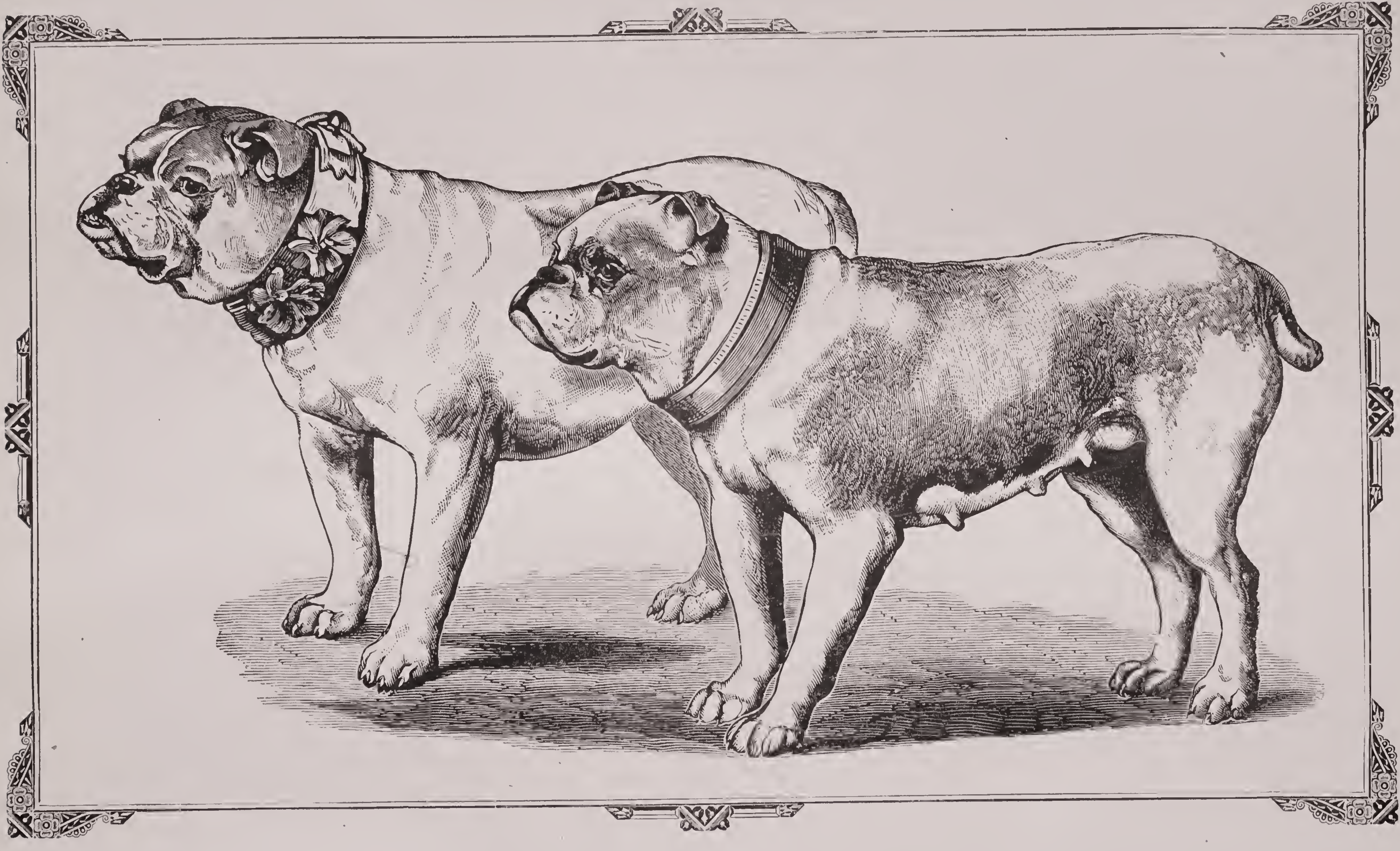


Fig. 31.—BULL DOGS.

ing kettles, or good forks to toast bread with, but takes the old ones for toasting forks; she has a place for everything and everything in its place, hence no time is lost in hunting for an article; she knows that there is no use in saving anything for future use unless she saves it in a way she can lay her hands on it when she wants it; she is prompt to clean or make repairs before it is so late as to become a difficult or an impossible task.

"A wife can throw out with a spoon faster than a husband can put in with a shovel," is a trite old maxim, too often demonstrated to be doubted. Here is how it is done: Cream and milk are allowed to spoil the pans; crocks are not scalded and dried and milk sours; coffee is charred instead of browned; tea and spices are left open to lose their strength; flies get into the molasses, and wade through soft butter all day, because proper care is not taken; fruits are not sorted, and rot and spoil; vinegar stands in metallic vessels until both are spoiled, and sometimes made poisonous; sugar is fed to flies or wasted; sauces are made too sweet or too sour, and are thrown away or left to spoil; dried fruit gets full of worms or musty; potatoes sprout and grow or rot, for want of care, breeding malarial diseases in the family; meats spoil for want of salt or brine; hams become alive with worms, or strong; dried beef gets too hard or wet, and is spoiled; cheese gets "skippery," or molds, or mice destroy it; lard gets strong; butter becomes rancid, because improperly worked and not covered with brine; fuel is wasted and stoves are burnt out or cracked by needless fires; lamps are burned unnecessarily; clothing mildews, or is spoiled in washing, or is whipped out on the line; costly laces are ruined in starching, and brooms by careless use and not hanging up; carpets are scratched threadbare with stubby brooms, while dirty porches and brick walks are scrubbed with new ones; towels are burned out from being used as holders; good sheets are used to iron upon, and burned; sad-irons become rusty, and spoil clothes; table linen is eaten by mice, or put away damp to mold; fruit stains upon linen are left to become fixed colors, instead of being removed at once with boiling water; napkins and towels are used for dish-cloths; water is allowed to spoil the varnish on furniture, or the children to mar it; glassware is broken with hot water; tinware is spoiled with extreme heat; water freezes in pitchers, kettles, tubs, etc., rendering them useless; slops and ashes are thrown away instead of saving for pig-sty or for fertilizing the garden; eggs are allowed to spoil, instead of being marketed, used or properly packed; small fruits and berries, canned and preserved fruits are allowed to sour, and are thrown away, instead of being converted into vinegar; stoves are cracked by water or covered with unclean grease and grow rusty; bread is spoiled by a dirty, smoky stove, which a little exertion would make good; clothes become useless for want of a stitch or the brush; moths destroy furs, carpets, etc. A thousand and one other leaks occur in the careless household, representing so many dollars or cents, and in the course of years the loss is frightful—enough to keep an otherwise prosperous man poor for life. With a knack of system all these losses may be averted. But with all the above and a thousand other efforts to save useful things, one should have the good judgment not to spend more time on a thing trying to save it than it is worth.

While the farmer may produce the most toothsome vegetables, fruits and meats, few articles are eaten without preparation, and an army of errors and dangers intervene between their production and the stomach. The indulgence of gross passions drag men down to barbarism; but the cook is accountable for many of the ills, woes and tumults which are devitalizing human vigor on the earth. They are responsible for a large per cent. of the sickly lives and premature deaths in the United States. In far too many instances a woman who considers herself competent to manipulate the frying-pan, boil tea and coffee, make dried-apple pies with raw-hide covers, and wipe dishes with a greasy rag, calls herself a cook, and boldly takes into her reckless, ignorant hands the welfare of innocent people, who never tortured her in their lives. Every housekeeper should realize that ignorant or careless cooking may result in the loss of health, or life itself, to one or more members of the family for whom she cooks, herself included. This is no "warmed-over" truth. It is steaming hot, and the sooner it is realized by the cooks of America the better it will be for the nation. The wife and mother who will not learn to perform her part well makes her family unhappy, and destroys her title to respect and love. Her husband and children notice better kept houses, better cooking and happier faces in other homes, and are dissatisfied with their own. Fault-finding and suppressed condemnation follow, and the negligent wife and mother loses her queenly prestige.

"WHAT FOR DINNER?" "If I only knew what to get for dinner!" is the housekeeper's troubled cry. If she cannot do more, she can at least vary the old varieties by bringing them to the table in a different dress. Even this is more of an art than may be supposed. A reasonable variety of food is indispensable to bodily health and comfort; not necessarily a variety at each meal, but from day to day and week to week. There is hardly anything more delectable than broiled steak and mashed potatoes, if you are only hungry and have not partaken of them for a considerable time; but let them be set before you every day for months, unvaried in their manner of preparation, and you get to dislike them. Potatoes boiled with skins on are nice enough for anybody; but let potatoes so cooked be the order of every meal, and everything that bears resemblance to a potato peeling will soon become an object of disgust.

Fretfulness, scolding and anger are noxious weeds, which crowd out every good fruit and flower. Do not cultivate the weeds in the kitchen or elsewhere, but keep them down, that home virtues and graces may thrive like a "tree planted by the rivers of water." Do not exhibit the weeds to those who call, nor burden them, unasked, with recitals of domestic perplexities. Every house has its skeleton; but every well regulated dwelling has a closet in which to hang it. No mortal lives but has his sorrows. To retail them about a neighborhood is evidence of weakness, from which one instinctively recoils. It is like exhibiting a hole in your dress or a sore in the flesh. Better hide them until a patch or cure makes your appearance better. Bad temper spoils children and servants as well as the heads of families. Cheerfulness is the well rigged ship gliding smoothly over a ruffled sea. A mind made wretched by every disappointment and rebuff is small indeed, and apt to be wrecked on the storm-tossed ocean of life. Knowledge averts trouble and disarms disappointment. Learn to cook well and you will not have spoiled bread, cakes, puddings and unsavory dishes with their manifold perplexities. Ignorance makes a poor mechanic or wife, and saddens life, unless the possessor is so great a fool as to be unconscious of the torture inflicted upon others, and of his own littleness. Culture improves the apple, peach, horse and ox. The analogy extends to the human race. The man or woman who does not strive daily for personal and mental improvement is on the road toward barbarism. Such will miss the happiness of a pleasant home, with respectful and obedient children. Spasmodic efforts, like cleaning a house but once a year, are of no avail. The moment one enters a house he sees an index to the character of the woman who keeps it. We are all known by our works. A fine painting points to a good artist, a good watch to a skilled mechanic, and a neat, cozy home to a good and cultivated wife.

Dominique (dom-in-eek′), a breed of fowls: see Fowls.

Door: see Residence.

Dorking, a breed of fowls: see Fowls, Domestic.

Dormer, or **Dormer Window,** a perpendicular window in an inclined roof. Between its top and the roof is a recess roofed over, Gothic fashion.

Dorset, a breed of sheep. See Sheep.

Double-Tree, or **Evener,** the central whiffle-tree of a two-horse set.

Doughnuts, or **Crullers:** Take 3 pounds of flour, 1 pound of butter, 1½ pounds of sugar; cut the butter fine into the flour; beat 6 eggs light, and put them in; add 2 wineglasses of yeast, 1 pint of milk, some cinnamon, mace and nutmeg; make it up into a light dough, and put it to rise; when it is light enough roll out the paste, cut it in small pieces and boil them in lard.

Another: Half a pint of sweet milk, half a cup of butter (scant), one cup of yeast; salt; flavor with nutmeg or cinnamon. Mix them at night. In the morning roll out and let them rise until very light, and drop in hot fat. They are very nice, after they are fried, to roll them in pulverized sugar.

Another: Three cups of sugar; 3 eggs; 1 cup of butter; 1 pint of buttermilk; 1 cup of cream; 1 nutmeg; saleratus sufficient for the buttermilk; mold with flour.

Pan Doddles. Make a sponge just as you do for bread over night. In the morning take from the bread dough small pieces about the size of a walnut, shape them rather long than round; fry in boiling hot lard a light brown; serve hot in a covered dish; pull them open and butter them. You will find them both simple and delicious for breakfast.

Dove-cote (duv′cot), a small building or box raised to a considerable height above the ground, in which domestic pigeons breed; any apartment or house for doves.

Dover's Powders. Ipecacuanha, in powder, one drachm; powdered opium, one drachm; powdered saltpetre, one ounce. All well mixed. Dose: From 8 to 20 grains. The chief effect is to promote insensible perspiration.

Dovetail, to unite two pieces by one or more tenons, which are in the form of a spread dove's tail.

Dowel (dow′el), a piece of wood driven into a wall so that other pieces may be nailed to it. A "dowel-pin" is a pin of wood or metal used for joining two pieces of material by tightly fitting a hole in each, as in a barrel-head.

Dower, or **Dowry,** is that portion of the real estate of a man which his widow enjoys during her life, or to which a woman is entitled after the death of her husband. In most of the States the widow is entitled to dower of personal as as well as real property. Estates of deceased persons are administered in courts of probate. Laws upon the subject of dower differ in the different States.

Draft, an order given by one bank upon another for the payment of a sum of money. This is the best, and generally the cheapest, way to transmit money in any large amounts.

Drainage, the withdrawal of superfluous or injurious moisture from land by means of artificial conduits. Twenty-five years ago it required a good deal of argument to convince the average farmer that under-draining was in many cases a necessity. All readily admitted the practicability of removing surface water from swamps, bottom lands and sloughs, and surface ditching, where a fall could be obtained, was an easily understood method. But the plan of "blind ditches" and under-drainage, especially with tile, was long looked upon with doubt. Now, however, no intelligent farmer is so silly as to deny the utility of under-drainage with tile. The fact that this kind of farm improvement is being largely prosecuted in Illinois and others of the Northwestern States, shows how completely the doctrine of drainage has won its place in American agriculture.

What Lands Require Drainage. All lands, of whatever kind, in which the spaces between the particles of soil are filled with water, within four feet of the ground's surface, need drainage. It is not meant by this that the particles of the soil should be dry, for that would destroy their fertility. But water should not fill the spaces between the particles, or surround them, because that prevents the ingress of air, so necessary to the germination and growth of plants. The soil has been compared to a barrel of chips; it may be filled with water, when the chips will absorb a portion, but still the water will fill the spaces between the chips. But puncture the bottom of the barrel, and the water will drain off, leaving the chips, and admitting air to fill the space between them. A soil over-burdened with water is like a barrel of dirt on which water is poured. The dirt will continue to absorb the water till the particles are full. If water is continuously poured upon the dirt it will become sodden, the spaces between the particles becoming full. If the pouring is continued the water will at length run off the surface, the mass of dirt being no longer able to take up the moisture; this may be compared to surface water in swamps. If holes were bored in the barrel's bottom, the surplus water would run out, while the particles of soil inside the barrel would absorb the water in its passage through, and retain it for a long time. This exhibits the nature and principle of drainage. If we bore a hole in the side of the barrel at a certain distance above the bottom, the surplus water as poured in will run out. This represents a drain, and also the "water level" that exists in all soils.

Horace Greeley said that probably one-third of New England, one-half the Middle States and three-fourths of the Mississippi Valley may ultimately be drained with profit.

A careless survey of a field is sufficient to determine whether or not it needs drainage. If a plowed field, wholly or in part, shows constant dampness on the surface, indicating that as fast as water is dried out of the top soil it oozes up from the subsoil, and after rains it is much longer than other lands in becoming dry, that land needs drainage. This saturated condition of the soil can be tested by digging a hole, four feet deep, which, if the conditions just indicated exist, will partially fill with water, especially in a wet season, or after a rain. If water stands on the surface some time after a rain the land should be drained. If the soil is clayey, and after a rain and subsequent sun and drying winds, "wind cracks" come in the surface, it is a sign that the land needs drainage. Sometimes corn is observed to curl after a brief drought; this generally indicates too much water in the soil at some depth below the surface. Spring water, ooze, and a general "squeechiness" of the soil can always be remedied, and the land doubled in value by tile draining.

Why do Lands Need Drainage? Too much water in soils excludes air from the germinating seed and plant roots. Both should be filled with moisture, but not surrounded by water. A soil in a proper condition should be free from surplus water, so as to admit the air freely among the particles to the depth of four feet. Such will be the case if it is thoroughly underdrained. The particles of soil will hold moisture by attraction or absorption. Soils which require drainage are not in this condition. When they are not saturated with water they are generally dried into lumps and clods, that are almost as impenetrable to roots as so many stones. The saturation of the soil renders it unfit for a growing crop either in a wet or dry season. It is cold, unfriendly, and the harbor of noxious gases inimical to plant growth. It kills the vitality of the seed, and if the plant struggles out of its comfortless and sickly bed to the light of day, its roots take hold on infirmity in the start, and its growth is feeble and its end unfruitful. Manures applied to such soils are nearly thrown away. Now and then a season neither too wet nor too dry comes, and a tolerably good crop can be raised. But usually both labor and fertilizer are expended in vain on such soils. Lands which suffer most by drought are benefited most by drainage. When air is allowed to circulate among the lower and cooler (because more shaded) particles, they receive moisture by the process of condensation. So when the subsoil becomes loose by drainage, the air is admitted, condensation takes place and the resulting moisture is absorbed by the particles. The subsoil being also open and accessible, the moisture from below rises, is vitalized by the air and absorbed by the particles and the plants. The depth to which the soil is made friable admits the deeper influence of the sun, and also permits the plants to strike down into the subsoil, drawing therefrom moisture and nutrition. The chemical processes of plant growth are thus promoted. Land not drained is of necessity cold; it warms up late in the spring, and becomes cold early in the fall, favoring early and late frosts. For this reason undrained land cannot be cultivated early in the spring, which is a serious drawback. Neither will it admit of deep tillage, which is indispensable to good farming. A writer on agriculture sums up the benefits of drainage in the following comprehensive terms: With deep culture and drainage the surplus water is rapidy carried away, evaporation is moderate in the spring, the soil warms up, and vegetation starts with vigor. But the constant heats of summer do not exhaust the ground of all moisture, as the deeply worked subsoil can hold its normal supply by capillary and adhesive attraction—which experiment proves to be equal to nearly one half the measure of the soil itself—and a moderate evaporation is kept up, during the entire summer, which modifies the extreme heat, and supplies necessary moisture to plant growth, which goes on with all the vigor of healthy life. The great quantity of water necessary to sustain the exhalation of plants when in growth, has been ascertained by experiments in the case of many plants, as of wheat and clover, to be for the growing season, two hundred times the dry weight of the plants themselves. This for a good crop of clover would be about 400 tons to the acre, or two gallons per square foot, of water exhaled from the leaves while in growth. How apparent, then, becomes the necessity of securing that condition of the soil which will absorb and hold a generous supply of water, to meet these immense drafts during the dry months of the year. We think we shall find in this system a remedy in great part for our leaf blights and mildews, etc.

Will it Pay? It is only necessary to point to the testimony of practical men who have tried drainage—especially underdrainage with tile—to answer this question in emphatic affirmation. From the time that John Johnson, in New York, began to "bury crockery" in his farm till this latter day, when Michigan and Illinois farmers are converting swamps and sloughs into grain-burdened, arable fields, a uniform "Yes; drainage pays," has been returned to every doubting query. By over a thousand circulars mailed by one gentleman to farmers all over the country, he received the common statement that underdrainage pays from 25 to 100 per cent. The common farmer will not average a yield of over 13 bushels of wheat and 35 bushels of corn to the acre on land that needs drainage. The cost of production, interest on capital, and capital itself will yield but little or no profit. The same land thoroughly drained, will average 25 of wheat and 60 of corn to the acre, a difference that will cover the cost of draining in two years. Gentlemen have informed the writer that their underdrained lands in Illinois would yield 100 per cent more crops than they did previous to drainage. It has been estimated by farmers who have practiced drainage for years that the increased product consequent on drainage, on a given area of land, would defray the expense of drainage an equal area. The foregoing statements being true, there can be no doubt about the profit of drainage.

Surface Drainage. This method, by open ditches, was undoubtedly the first for freeing land from surface water. Where the overflow is large, and the necessity, for health and profit, great that the water be drained off, ditches provide the readiest and cheapest means. But as a method for thorough drainage of large areas, they are objectionable; for they occupy too much land; they are a great inconvenience in cultivating adjoining lands; cause accident to stock, and are an obstruction to teaming; they produce weeds, which foul the farm; they cave in and need continued repair; they are never deep enough to properly drain surrounding land: they carry off the very richest part of the soil and manure, which is washed into them by the surface streams; and they induce disease by holding stagnant water in times of drouth. Open ditches are hence defective for thorough drainage.

The cultivation of land in ridges is another method by which a moderate degree of draining is practically effected. By plowing into narrow lands with wide, open furrows between, or by turning two furrows together from opposite directions and leaving a large, open space or water furrow between each two ridges, and planting directly upon the top of each ridge, some of the advantages of draining can be secured. But in such cases they must be obtained at the expense of extra work in preparing the soil and cultivating the crop.

Under-drains. The primitive method of underdraining was by boards and stones, so placed that a conduit for the passage of water in the bottom of the ditch would be formed. There were various plans for making under-drains before tile came into general use, but the latter has so superseded the old way that it is useless to treat any other at length. We will briefly illustrate here such cheap drains, as they are still needed in pioneer districts. They are of various devices, Figs. 1 to 4, and they serve very well until the country becomes more densely populated and wealthy, when tiling can be afforded. Fig. 1 shows the ends of the poles in the plan of the ditch or drain; Fig. 2 shows the stones, in a similar situation; Fig. 3 shows how a narrower ditch, at the bottom of the main one, is covered by a single board, and the earth filled in over it, as in the preceding methods; and Fig. 4 points out how three boards are placed. The last is the best plan of all four, as it better protects the drain from filling up with sediment.

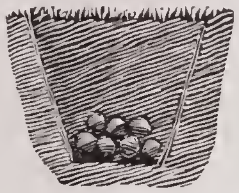


Fig. 1.—*Pole Drain.*

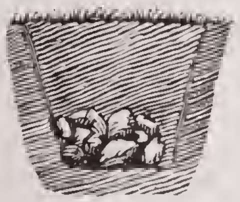


Fig. 2.—*Stone Drain.*

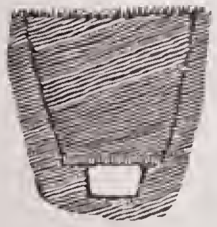


Fig. 3.—*Single Board Drain.*

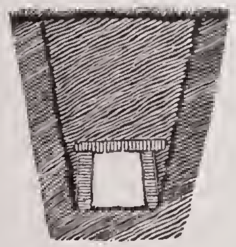


Fig. 4.—*Box Drain.*

In putting down these board drains, which in clay soils will last for five to ten years, dig the ditch and take two by four-inch hard-wood plank (oak and cedar are preferable) for side pieces. They may be of any length. Leave undisturbed elevated spots one foot long, three feet apart in the bottom for side pieces to rest upon. Place those down and cover with boards. Should the drain be narrow, one-inch boards will answer; but two-inch plank cut in pieces of one foot in length, or slabs with sides trimmed to fit closely, are better. Use no bottom board: water enters there. Fill the ditch with clay, placing surface soil at the top.

Tile Drains. These are the best and cheapest of all drains yet devised. Millions of dollars are now invested in their manufacture. Actual and universal good results have followed their general adoption. More than 20,000 tests in this country have demonstrated the value of under-draining, by this method, for the following reasons: Good tile drains, properly placed, last for all time, and do not fill up; it is the cheapest way known to accomplish the end; they are out of the reach of the plow, and therefore do not interfere with cultivation.

Tile for draining purposes are molded from brick clay by a machine for the purpose. They are 8 to 24 inches long, and in diameter from two to nine inches. Round tile with collars are generally preferred. They sell by the foot at about one cent an inch of diameter.

Probably, as to size, the following is as good a rule as can be had: For tiles taking only the rain fall on the land the tile should be two inches for four acres, three inches for nine acres, four inches for 16 acres, etc. A one-inch rain-fall per hour gives 22,633 gallons per hour for each acre, or 377 gallons per minute. These figures may assist in deciding the size of tile needed.

HOW TO LAY TILE. The usual distance between drains is 25 feet for three feet depth, 40 feet for four feet depth, and 80 feet for five feet depth. If the drains are 20 feet apart about 2,000 tiles to the acre will be required; if 40 feet, about 1,000, and if 80 feet, about 500. Deep digging for tiles is thought to be more effective and saves money.

Tiles are planted at from two to five feet below the surface. The depth must depend partly on the surface of the land. If a sufficient outlet five feet below the level of the land can be obtained, then sink your drain to that depth. In any case it must be deep enough to be out of the way of the frost, to give sufficient room for plants to grow above the water-line. It must be beyond the reach of roots, and deep enough to prevent evaporation of the water rising in the soil from the force of capillary attraction.; 30 inches is a common depth, but is not as effective as though from 6 to 30 inches deeper. A tile less than three feet in depth is liable to disappoint. The deep drain acts quicker and with more effect than the shallow. The tile costs the same, therefore plant deep, and your farm will repay you the first year.

To find competent outlet for drains is often difficult, yet it cannot be dispensed with. Make it as low as circumstances will allow, in order to get as great a fall as possible. The outlet should be protected by either brick or stone work, and a grate over it to prevent obstructions from getting into the pipe. If the opening is into a running stream, it will do no harm if the water in the time of freshets rises and enters the mouth, though it is well to avoid this when practicable. If the water from the drain is to be conveyed away by an open ditch the channel should be so low as to prevent mud or other substances from clogging the flow of the pipe. There are several different gates for protecting the outlet of drains from vermin, etc. Outlets should, of course, be into under-drains as much as possible, and not into open ditches.

In planning a system of tile drainage there should be a main drain extending under the lowest portion of the land. These mains, of course, will have to be of larger tile than those of the lateral drains. The most important part of tile draining is fixing the grade of the system; an imperfect grade of a few feet may render the entire system worthless. As much care must be used in grading the ditches for the reception of tile as in building sewers under cities. There must be a continuous slope or fall to every foot of the pipe, from the utmost end of the laterals to the outlet of the main. Drains must not be laid at a uniform depth from the surface unless the surface is a perfect grade line, which is seldom or never the case.

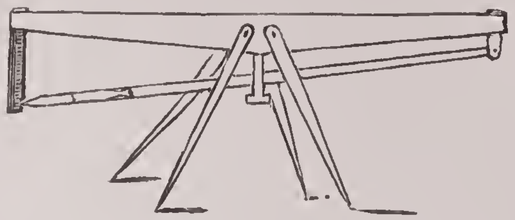


FIG. 5.—*Leveler.*

Figure 5 illustrates the principle on which a leveler can be made that will enable the most inexperienced to determine accurately the proper grade in ditching. The upper portion, or body of the instrument, is of wood, measuring exactly six feet three inches from the inner edge of the scale to the point directly above the hinge of the pointer. The scale, attached as shown, is made of heavy sheet iron, graduated to one-sixteenth of an inch to the foot. The zero point of the scale is at a distance from the upper edge of the instrument exactly equal to that of the center-point of the pointer-hinge from the same edge. The wood pointer has a spirit level attached to its side in the end near the scale. The level is so constructed that the bubble can be seen both from above and below. The pointer should be made either to work tightly, or should be furnished with a clamp. The machine should be mounted on four legs (fixed as shown in the cut), so attached as to be readily folded and strapped to the sides. A little ingenuity must be exercised in adjusting the legs, or the instrument will "wabble." The handle in the middle is only for convenience in carrying.

TO USE THE LEVEL. Set it upon the highest point of the ground to be drained. At the point whose difference of level is to be ascertained, fix a stake at exactly the height of the center of the instrument when set. The use of the instrument is simplified by making this distance 100 feet, or even fractional parts, as 50, 33⅓ or 25 feet. Now let the operator place himself at the end of the instrument where the scale is attached, sight along the top of it and bring its upper edge on a line with the top of the stake. Be careful not to move the body of the level after it is adjusted. Now raise the pointer until it is horizontal, which is shown by the spirit or water level in the pointer. The number of sixteenths of an inch which the pointer designates, if the distance between the stake and instrument is an even 100 feet, will be the fall in feet to the one hundred feet. If the distance is one-half of one hundred feet, each sixteenth will represent six inches, or one-half of one foot, and the same proportion is true of one-third, one-fourth, etc. The result may be verified by taking a back sight—that is, changing places of the stake and instrument, and sighting from the opposite end of the machine back, or up hill. The readings should agree. A profile of the ground can be made by taking several bearings. In leveling long lines several stations are necessary. To use the level in grading the bottom of the ditch, bring the instrument on a line with the stake, as in the first case. Make the pointer horizontal and clamp it to the scale, fold the legs, reverse the ends of the machine, and, grasping it by the handle, lower it into the ditch. If when the level is placed therein, the pointer is kept horizontal, as will be shown by the attached level, the upper edge, now resting on the ditch, will be parallel to its former position, and make an angle with the pointer equal to the required grade. The ditch being parallel of course to the edge, will have the proper slope.

If the bottom is ordinarily firm, begin laying at the lower end of the drain, putting in and covering it up as fast as the digging proceeds. This is different from the method formerly advocated by Waring himself, and formerly universally practiced—that of laying open the drain the entire length before beginning to lay the tile; but Mr. Waring now advises this manner of procedure. In beginning to dig, strike a line to mark one side of the ditch; remove the sod to a spade's depth (15 inches wide) for a length of two rods, and a ditch can then be dug 18 inches deep, with narrow bottom. A ditching spade, 20 inches long in the blade, six at the top and four at the point is then to be thrust in, whole length, and the dirt thrown out. The loose earth, escaped from the spade, can be thrown out with a scoop, four inches wide, the workman walking backward and drawing the scoop toward him. In this way he gets down three feet, and gets a smooth floor on which to stand. Beginning again at the end next the main, with a narrower, sharper spade of the same length, or a little less, he digs out another foot of earth, facing the main and working back, so that he always stands on the smooth surface, three feet below the surface of the ground. When he has dug for a length of two or three feet, he takes a snipe-bill scoop, and removes the loose earth. The round back of this scoop, which is always working a foot below the level on which the operator stands, and performs the office of a shovel, smooths and forms the bottom of the trench, making a much better bed for the tiles than it is possible to get if it has to be walked on, as is the case when the trench is opened from end to end. When the trench is dug and graded for a short distance the work of laying the tile can begin. First uncover the branch or junction piece of tile, and make the connection with the new drain. Then proceed, using a tile layer, the operator standing astride the ditch. The collar is placed on the end of the branch, on the upper end of the tile. The instrument lowers the tile (with its collar in place), and the other end is carefully inserted into the second collar, and so on till the drain is laid. Then throw carefully down the clayey part of the subsoil, and tramp it into place, all but the collar end of the tile being covered, and have the ditch filled at least half-full and pounded down, or well tramped. Another rod or two of the ditch can then be opened and dug out, laid, and filled up, as described—the amount at any one time not being enough to allow of a dangerous accumulation of water. At night the tile is left with a plug of grass or straw in the end to prevent dirt running in, in case of rain. Where a gang of men are to be employed in laying a single drain, they can follow each other in the successive gradations of the work, one opening the surface of the drain, another taking out the second spade-full of dirt, another the third, etc., and a man following with the tile-layer. Of course where the land is sandy, gravelly, or loose, the walls of the ditch may have to be kept in place by boards. Where the soil is full of large stones the work of opening the ditches will be much more laborious and difficult, and the regular order of the operation, as laid down above, will be somewhat broken. In laying, if the ends of the tile are jagged, trim them with a hatchet, so that they shall fit together perfectly, as much depends on this, and the skill with which the connections are made. Often in new drains small particles of dirt find their way into the channel. Sometimes it works into the drain while it is being laid. This deposit is carried along by the stream in the pipe, sometimes causing a complete obstruction. To remedy this, a "silt basin" is placed where the grade is slightest, or at the intersection of the mains. The handiest basin of this kind is made by sinking a tile two thirds its length in the bottom of the ditch, and making the tile above and below empty into it; or, rather, the drain passes through it. The bottom of the basin should rest on a flat stone, or solid piece of plank, and the top also be securely covered. The traveling particles tumble into the basin, and unless there are more than enough to fill it, can do no more harm. In filling the ditch it is well to have the basin uncovered for a few days, until the drain has thoroughly washed out, then fill. This will be a good point at which to search for trouble afterward; and its location should be marked. It is well to make a map, showing the exact location of every part of the drain, connections, silt basins, and all. This can be done before beginning work, while it is in progress, or when the system is completed. Mark in the map distances between connections, length of each stretch of pipe, etc., so that any trouble in the future can be sought out and remedied.

FURTHER SUGGESTIONS. A very handy way to fix the grade of a ditch is, find the greatest aggregate fall to be obtained in the whole length of the drain, without placing the outlet so low as to cause its obstruction by backwater. Then find how much fall there is in 100 feet, or in a rod. For example, if the fall is found to be one inch in a rod, attach by screws to the lower edge of an ordinary level a straight piece of pine of the same thickness, eight feet three inches long (one-half a rod), and, say, two inches wide at one end and two and a half inches at the other, placing the level at the wider end for the convenience of handling. Then begin at the outlet, finishing the bottom of the ditch level, as indicated by this instrument, always keeping the wide end toward the outlet. When the bottom of the ditch is made soft or uneven by running water, or otherwise, the level should be tried on every two or three tiles laid to insure accuracy. When the bottom of the trench is too soft to support the tile in line, a few inches of gravel or hard earth will make it sufficiently solid. Plank should never be used, says one expert, for the reason that they will finally decay, and allow the tile to settle and destroy the drain. The joints should be covered with gravel or tame grass sod, with the grass side next the pipe. Marsh hay, though it may be sometimes used, is not desirable. Marsh sods should never be used, for they will often cause the pipes to be filled with compact masses of fine water-grass many feet in length.

The following table will aid in calculating the size of pipe needed for any given tract of land, for a fall of six inches per 100 feet:

Size of Pipe in Inches.	Capacity of Pipe per Min. in Gal's.
4	75
6	213
9	576
12	1,220
15	2,108
18	3,306
20	4,320
22	5,498

Draught, Angle of, the angle made by the line of draught with the general direction of the body drawn.

Dredge, or **Dredging-Machine,** a machine for scooping up mud or earth from under water, for clearing the channels of canals, rivers and harbors. To dredge is to scoop up and remove mud from under water; also, in the culinary art, to sprinkle flour on, as roasted meat.

Drench, a medical drink administered to animals, principally to the horse. It is often preferred to a ball in flatulent colic and other cases in which the medicine requires to act with the utmost possible rapidity. A drench ought rarely, if ever, exceed a quart, and in all ordinary cases it may be administered by an expert operator with a strong, smooth-necked, wide-mouth bottle, and by an expert operator with a cow's horn. In administering a drench the head of the animal should be held firmly. A drench is in some degree more or less dangerous, for it is often bunglingly done, and consequently inefficient. Every such draught is in particular hazard of finding its way down the wind-pipe and exciting inflammation in the lungs. To make a drench to be used in case of colic take sulphuric ether, ½ ounce; laudanum 2 ounces; flaxseed oil, 1 pint; mix. Or, take spirits of turpentine, 1 ounce; tincture of aconite root, 25 drops; aloes, 1 ounce in solution; mix. Or, take warm ale, 2 pints; ground ginger, ½ an ounce; tincture of aconite root, 20 drops; mix. Used in flatulent colic, accompanied with swelling of the abdomen. Or, laudanum, 2 ounces; aloes in solution, 1 ounce; chloride of lime, ½ an ounce; mix. Or, take tincture of aconite root, 20 drops; aloes in solution, 1 ounce; sulphite of soda, 1 ounce; mix. Or, spirits of hartshorn, 3 drachms; aloes in solution, 1 ounce; water, 1 pint; mix.

Dressmaking. Notwithstanding the almost incessant changes of fashion, there are certain general rules in the art of dressmaking that never vary, and which it may be well to point out for the instruction of those who are desirous of making their own dresses. By adhering to these instructions the ladies of the country may be as capable of making their own dresses fit as neatly as could be furnished by the most accomplished modiste of the city. In purchasing a dress, always buy a little more goods than is required: this will come in usefully for repairing, altering and renewing the cuffs, etc., or perhaps it may be required for a new body. Also, if a dress is too scantily made, it will never look well, however expensive the material. In buying silk you can best ascertain its thickness by holding a part of it between your eyes and the light. If very stiff it is highly gummed, and therefore cannot wear well, as the gum will cause it to split and crack at the gathers. Soft, thick silks, with both sides alike, cut out the most advantageously and wear the best. Figured or flowered silks look beautiful for a short time, but in consequence of their flossiness the sprigs soon begin to wear rough and the spaces between them seem to appear shrivelled and contracted. This is the case with most silks which have figures embossed or thrown up on the outside. What are called watered silks look after a while as if they had been literally watered or wetted all over.

To Cut out the Body of a Dress. In commencing a dress the first thing is to cut out the bodice-lining, which should be always made of good linen, as lining that is thin and coarse will stretch out of shape when the material is put on it, and shrink very much if wanted to wash. For a white dress, or any one that is to be washed, the lining must be of linen that is perfectly white, otherwise the brownish tint, however pale, will show through. For a dark silk or merino dress the lining may be of brown goods. A yard of linen will make a bodice for a person of moderate size, and it must be quite smooth when you cut it. The person to be fitted should wear at the time one of her best fitting dresses. Over the fore-body of this let the linen be pinned, placing it bias, and putting several pins at the shoulders, waist and sides. Fold over at the bottom of the waist two very large pleats, slanting upward, and diminishing gradually to a point as they ascend to the bosom. If these pleats are small and narrow, the dress will be inevitably too tight across the front, compressing the bosom painfully, and making it look flat and contracted. This is a very common fault with dressmakers, who depend upon giving an artificial fullness to the bosom by means of wadding. The fore-body leaves off at the shoulder-seams, and after it is fitted the back should be done. The lining of the back must be cut straight way of the linen (not bias), and it must be pinned very smoothly on the back of the dress worn at the time by the person for whom it is intended, allowing sufficient everywhere for hemming in, and for outlet if the dress should afterwards be found too tight. The lining must be allowed longer in the waist than the model dress, as it takes up greatly in sewing on the skirt. For a person of hollow back and taper form, the side-seams should have a considerable slope inwards from the arm-hole to the lower extremity of the waist, otherwise the dress will not set well into the lower part of the back, even when made very tight. Where the waist is thick, the slope inwards should be less; and some figures require little or no slope. If the back of the person is rather round, or the shoulders very prominent (as they frequently become from habitually compressing the waist to excessive tightness) the body should be cut considerably longer behind, so as to allow sufficient space for the projection of the shoulders. When the back is flat and straight the body need be no longer behind than at the sides. Be very careful not to cut the body-lining too short either behind or before, for to all figures a short waist is the most unbecoming. In cutting out the sleeve-holes notch them in front and allow them sufficiently easy, particularly just under the arms. Give the shoulders a considerable slope inwards towards the neck, otherwise the dress will set too loosely about the upper part. Next, with a piece of tape measure the length of skirt from the waist behind down to the heels, allowing sufficient for the hem and facings. After the lining has been fitted and cut out over the model dress, take it off and baste it together; also basting down the large pleats. Then let it be tried on and fitted a second time upon the corsets only. This is the time to remedy any faults in the cutting out or basting together. If it is found too loose about the upper part of the back, slope it in a little more toward the neck. If too tight, let it out sufficiently by opening the shoulder-seams. Should the lowest part of the back be too loose, take it in a little at the side-seams under the arms. If the waist is too tight, let it out at the side-seam of the fore-body; or it may be necessary to let it out at the back and the fore-body.

A dress, to fit well, should have no wrinkle whatever under the arms, or, indeed, in any place where it ought to be perfectly smooth. A body will frequently set badly not because it is too loose, but from the sleeve-hole being so small that the dress cannot be got on sufficiently, causing it to hang off and wrinkle down. When this is the fault, the remedy, of course, is to enlarge the sleeve-holes. When sleeve-holes are found too tight, cut them away just in front and under the arms, and then round them off nicely at the back. If left too tight when the lining is cut out, they will not be any looser when the dress is finished, as the ridge made by the seam in putting in the sleeve always fills up whatever space is allowed for the sewing. When the fitting of the lining is finished, do not, after stitching them down trim off the inside folds of the large pleats, but allow them to remain uncut, in case it should at any time be found necessary to let them out for the purpose of enlarging the body. They can be made to lie perfectly flat by felling down the folded edge on the inside.

In making the fore-body of a dress the silk or other material that constitutes the outside should always be cut precisely bias; otherwise neither the pleats nor gathers, nor, indeed, any part of the front can set well. To do this, fold one corner quite sharp, and make the middle of the fold lie exactly even. If the silk is not wide enough for a perfect bias, join it at the selvage to another selvage piece running just the same way. An imperfect bias causes the pleats to twist or warp and the whole to go wrong and unevenly. In cutting the outside of the fore-body, see that there is amply sufficient, both in length and breadth, for all the pleats or gathers, allowing it wider considerably at the top than at the bottom. If the dress is of the material that is to be washed, the upper part of the fullness should be gathered; as loose bias pleats cannot be ironed to look well, or even tolerably, the lower part of a gathered front may be stitched closely down. Wherever there are gathers in a dress, make them small, and stroke them neatly, as in making up linen. The pleats should be laid smooth and even, so that no part of them may rise or stand off even in the smallest degree. Baste or run them down to the lining, concealing the stitches of each pleat under the pleat that falls over it. If there is to be wadding at the bosom, you may insert it between the lining and the outside before you cord the neck. But the best way is to put it on after the body is finished. To do this, cut out two circular pieces of wadding of sufficient size, lay on each of them another round piece about an inch smaller in circumference, upon that put a third, and fourth, fifth, and sixth round pieces, each diminishing in size, till the last is not larger than a five-shilling piece. Baste each of these piles of wadding upon a circular piece of white glazed muslin, notching the edges of the muslin and turning them in. Then sew them to the lining of the body so as to have wadded pieces next the corset, and not between the lining and the outside. In stitching down the lower part of the pleats (where they diminish in width towards the waist) make a second row of stitching on the extreme edge of each.

A fore-body, to set off the figure, should fan very much, the pleats or gathers spreading full above so as to give breadth to the chest, and narrowing into a small compass at the bottom of the waist, where they meet in the centre. The space on each side of the pleats should sit quite smooth to the waist and be perfectly free from wrinkles. The outside of the stuff must be cut straightway of the stuff, like the lining. For a full back (they are sometimes in the fashion) the lining must be tight, but the outside must be cut large enough to allow of gathers at the lower part and shoulders. A full back gathered into the middle of the neck rarely sets well; the gathers should fan from the shoulders down to the waist. Great care must be taken in making a full back not to let it puff out in the middle—a most disfiguring fault, and one to which full-backed dresses are very liable. The gathers should be small and nicely stroked. If the back is gathered, the sleeves and skirt should be gathered also. It is now usual to have no seams in the backs of dresses, except under the arms; but some persons still prefer having the form or shape designated by narrow bias folds, beginning just below the middle of the back part of the sleeve-hole, and descending to the waist, where at their termination the space between diminishes to about half a finger in width. These narrow bias folds are furnished with a cording. To put them on, baste them down on the back of the dress after it has been lined, giving them a slight curve, and then sew them on with the lining next to you, keeping the needle and thread on the lining side, and catching the under part of the bias fold as you take the stitches through. A cording must be let in at the shoulder where the fore-body is joined to the back. In putting whalebones into the body of a dress, use none that are not perfectly straight and even; if in the least crooked they will cause a drawing or puckering of the outside. It is usual to have whalebone up the middle of the front; one, or perhaps two, at each side of the fore-body, running in the same direction as the large pleats in the lining and extending up as far as the bosom, but not over it. Also a whalebone at each of the side seams and under the arms. It is not a good way to run in the whalebones between the lining and the outside of the dress, as their ends very soon wear through the outside. Make a case for each whalebone, by sewing a piece of strong twilled tape upon the body-lining, then slip in the whalebones, and secure them well at the ends. Finish the lower part of the body with a cording felled down on the inside, and finish the neck in the same manner. The covering for cord should be cut into long slips, all of them exactly crossways, otherwise they will pucker and not set smoothly when sewn on. In sewing on cording, hold the dress next to you, take the stitches very short and close, and quite through. In plaid dresses or dresses with patterns on them the checks must be correctly matched in the seams of the skirt and bodice. Wherever there is a joint it is better to cut off a portion from one piece or the other than to allow the checks to come wrong. A perpendicular stripe of a check should always go directly up the middle of the back, and the cross stripes should be made to match precisely. The same accuracy is to be observed in making a dress of a striped material. In sewing on hooks and eyes use very strong silk, and put the hooks on the right side and the eyes on the left. For the sleeves they should be of a smaller size. If instead of eyes you work loops in button-hole stitch, make them very strong, or they will soon wear out and break.

To Cut Out a Plain Skirt. A dress skirt will not look well unless it is very full and wide; it should be long enough just to touch the ground. For a person of moderate size, a yard and a quarter in length will allow something to turn up for the hem. A tall person may require a yard and a quarter and a half-quarter for a hem. A dress made of narrow silk, that measures but half a yard in width, will require eight in the skirt, but if the material is less than half a yard wide, the skirt should be nine breadths. Any material of three-quarters of a yard wide will take six breadths; if but half a yard and half a quarter in width, there must be seven. A tall person should wear a full skirt, measuring at least five yards round, if without flounces. A dress, if lined through, will look much fresher when turned than one that has not been lined. The lining should be very thin. After breadths of the outside are all run up, measure those of the lining so as to fit exactly, and run them up also. Put the lining inside, whip the two raw edges together at the top, and baste the lining and outside together at the bottom. For the slit behind at the top of the skirt, hem down the outside upon the lining, securing it well at the termination, and taking care to turn in the selvage edge. Be also very particular in running up the breadths, or forming the sleeves, to take sufficient hold, so as to prevent even a thread of the selvage edge from appearing on the outside of the dress, as is frequently the case when seams are put together carelessly. It is well to notch with your scissors the selvage all along; otherwise the tightness of the extreme edge will draw up the breadths, and cause them to pucker at the seams. In sewing together the pieces for a frill, or a flounce to a silk dress, cut off the selvage entirely, and whip over the seams; for if the white edge is left on it will show at every joint.

If the skirt is pleated at the top, turn down an inch or two all along, and fix all the pleats exactly even, securing them for the present with pins, and afterwards basting them; leave a space directly in front of the fore-breadths. Take care not to have a seam on any of the top pleats, but fold all the seams underneath. The middle of the fore-breadth must come exactly to the middle of the fore-body, and the central gathers of the back-breadth must go precisely to the back-body. As the gathers are to be caught up and not whipped with a drawing thread, they can not be made till after the body is sewn fast to the skirt, but enough must be left to make them very full. Having basted the body to the skirt, stitch or sew them very closely with a strong silk thread. In doing so stitch the body very tightly and hold the skirt rather easy. Then put on the gathers at the back of the skirt, catching them to the body as you go along, and securing each in its place with a seamed stitch taken over the first. When they are all in, take a large needle and a strong thread, with a large knot on its end, and run it through the hole of the gathers as they stand in a row on the inside, and draw the thread tightly. This will keep them compact, and make them set out well. If the skirt is not lined all through, put a stiffener in the upper part of the two back-breadths, and sew it on with the gathers when you are making them, whipping it first to the raw edge of the outside. This stiffener may be of a double piece of glazed muslin about a quarter and a half quarter in length when doubled, and in width the same as the two back-breadths. Unless they are extremely wide do not double it exactly in half, but leave one of the lower edges a little longer than the other. Scollop it all round with your scissors.

The Sleeve of the Dress. After you have fitted the body-lining, take the measurement for the sleeves by means of a piece of tape from the armpit to the wrist, allowing a little extra length, as it will take up in sewing. If the sleeve is too short in the inside of the arm it will give a very awkward appearance to the wrist, exposing it bare whenever the arm is in the least extended, besides feeling most uncomfortable. We have seen sleeves in which this defect (shortness of the under side) was so great, that after the dress was on, it was impossible to raise the hand higher than the waist, the arms appearing as if skewered down to the sides. The remedy when the sleeve is too short is to put an addition to the cuff at the wrist, or else to take out the sleeve at the shoulder, rip it down the seams for about a half a yard, and then cut a piece from each side, which (though making the upper part of the sleeve narrower) will add something to its length under the arm when it is set in again. If the design of the sleeve will permit, it is perhaps better to increase its length by adding a cuff at the bottom, concealing the joint under a band. If you wish the sleeve to set off very much from the elbow, cut it very long on the top at the shoulder, and give it a great curve along the inside of the arm. On the contrary, if you desire that it should hang straight, give the inside but very little slope.

In cutting out the sleeves fold over the material into an exact bias; and if not wide enough at the top, cut a piece to join on, making both selvages to come together. This seam or joint had best go at the back of the sleeve. When the material is very narrow, it is necessary to join the upper part of the sleeves both at the back and front. That side of a bias sleeve where the threads run straightways must be put front or next the fore-body; the crossway side must go next the back—this is very important to the set of the sleeve. The top or shoulder part must be rounded at the back, and hollowed a little at the front, where it is seamed in at the sleeve-hole. The linings should be cut out with the sleeves, and exactly of the same form and size. Colored linings (unless of silk) are apt to rub off on the arm. White glaze linings are the best for the sleeves, if not for a washing dress; for a dress that may be washed, it is better that the linings should be separate from the sleeves, making them of cheap white cambric muslin, or any other cheap fabric. Gather these extra linings at the top into a band, and at the bottom into a wrist-band. They must not be so long as to appear at the outer lower slit of the outer sleeve. In setting on the sleeve, baste a cord all round the arm-hole, beginning and finishing at the side seam under the arm; then close-stitch the sleeve all round, leaving the cord to appear as a finish on the outside. Bands and their lining must be made crossway of the stuff. If intended to wash, it is best not to cord them at the edges, but to fell down the outside over a lining. Between the outside and the lining there should be a very stout stiffening of buckram. Cut all three perfectly even and baste them together till after the belt is finished. Line the flap or end that hooks over with a piece of the same material as the dress. If you cannot get a waist-band to match the dress exactly, get one that is rather of a lighter than a darker shade.

For particulars as to the styles of dress suited to persons and occasions and for harmony of color, see Etiquette, pages 393-4.

Harmony of Dress. In this connection, regarding the proper development of that taste which pertains to the person and clothing, a few hints will not be out of place. Outline, symmetry, contrast, color and harmony are the principal elements in the problem, after considering the cost and durability of the materials. It would seem of primary importance to have a well-developed and well-formed body, first, to clothe. Woman's dress should make her shoulders appear narrow and sloping. Long dresses make short people appear tall, and short garments make long ones short. Horizontal stripes shorten, while perpendicular ones lengthen. Loose clothing makes thin people appear larger, and large people smaller, while close fitting garments have the opposite effect. Black, while it has many objections, is generally more universally worn than any one color. A lady's dress admits of greater ornamentation than a gentleman's. Contrasts of color are as necessary as harmony. Some bright colors give life to black or somber shades. The proper harmony of colors requires artistic taste.

There are two distinct types of complexion, the blonde and the brunette. There are intermediate shades of hair, eyes and complexion, belonging to each, and requiring a peculiar character of dress. A blonde may wear violet, lilac, and blue or green. If very ruddy the blue and green should be dark. White, of course, may be worn with or without any of these colors. The ruddy blonde may wear russets, slates, maroons, browns, grays, drabs, fawns and stones. Those having rich, brown hair may wear, as a contrast, blue, pale yellow, azure, lilac or black, trimmed with rose or pink.

A brunette may wear black, scarlet, orange, yellow, plum or green. If the complexion is sallow, green and yellow; dark green and red or yellow are appropriate. A red or yellow face is benefited by blue or orange. Red and blue are relieved by purple and blue and yellow by green. White and black are appropriate to pale faces, but blue and red become them better. These harmonies are particularly to be considered in the selection of bonnets. In selecting colors, do so with reference to day or night wear, as some look better by artificial light, and others by natural light. White, yellow, crimson, scarlet, orange, and light brown are beautiful at night, and white, purple, orange, rose, lilac, dark blue and green suit the day. The complexion will bear stronger colors at night than by day. Large people look best in black, while smaller ones may more appropriately wear colors. Black or dark clothing will wear the longest.

Dried Fruits and Vegetables: see Drying and the respective fruits and vegetables.

Drill, a furrow for the reception of seed, or a row of growing plants; also, a machine for sowing seed in rows.

Drills, for sowing seed. A good seed drill is a remarkable piece of labor-saving machinery; and not the least advantage in its use is the comparative perfection with which it does its work. The seed is all put *into* the ground, and *evenly*. Besides, plants in drills can be *cultivated;* from broadcast sowing they cannot be. By the study of the features of the drills here represented, the reader will be enabled to judge of the good points of seed drills when he desires to purchase. It is, however, a hard matter to tell just which drill is "the best." As with other leading farm machines, mowers, reapers, etc., there are so many that seem to be just what a grain drill should be, that to choose among those conceded to be in the first class, is a very difficult matter. The best are all so good that one can hardly go amiss, and it makes little difference if taste, or an acquaintance with a particular style, influences the selection. In making the purchase, however, other things being the same, it is best to select the drill that has its factory nearest at hand, or is represented by an agent close by. The best of machines will need repairs, and most frequently at just that time when a day makes a great difference; so the quicker the new part can be obtained the better. We wish to state in this connection that it is true economy to sow grain with a drill, except in those stony, or stumpy, newly-cleared fields, in which a drill would neither do its work well nor with safety.

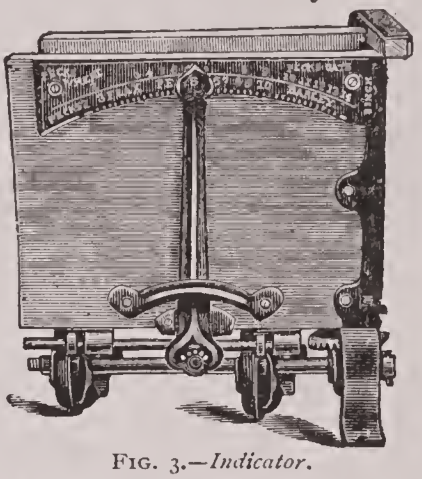


Fig. 3.—*Indicator.*

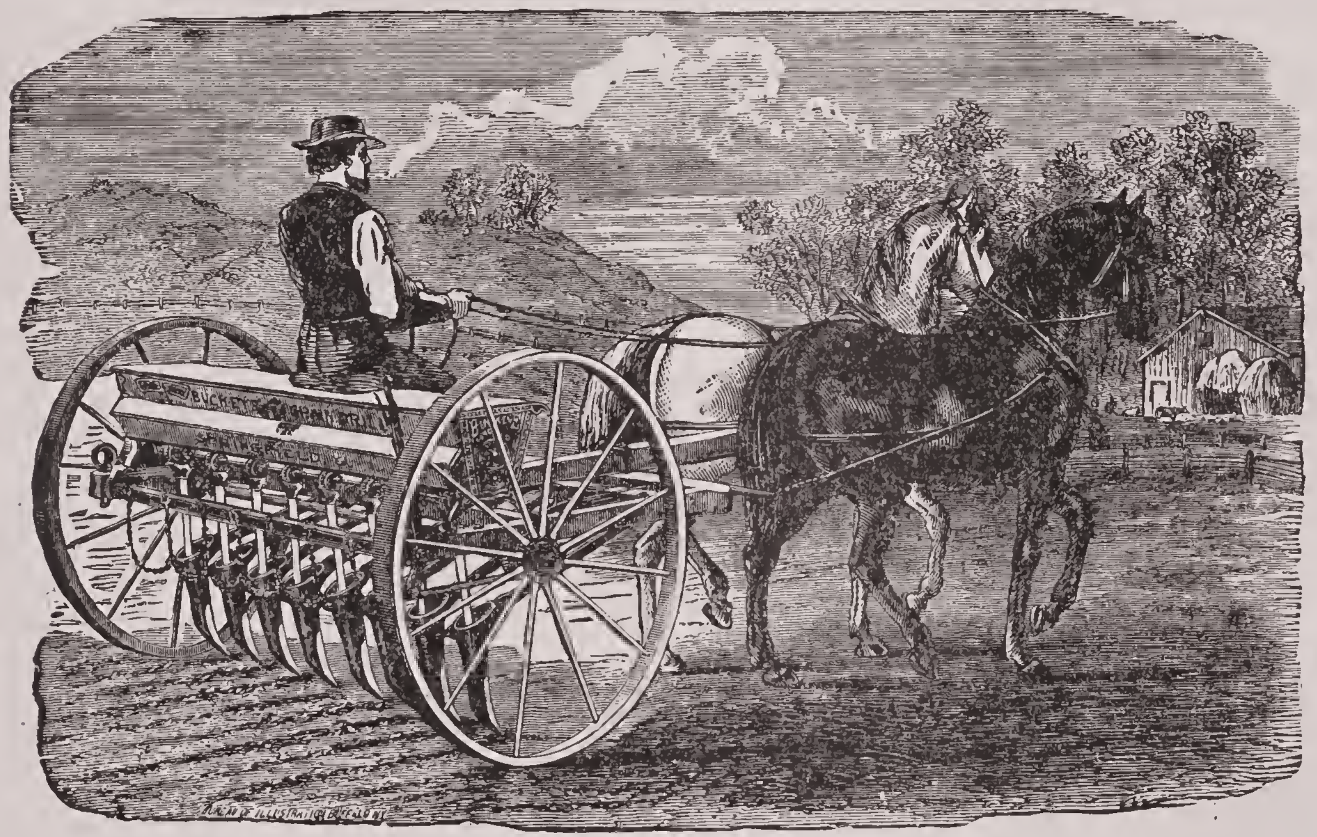


Fig. 1.—*Force-Feed Grain Drill.*

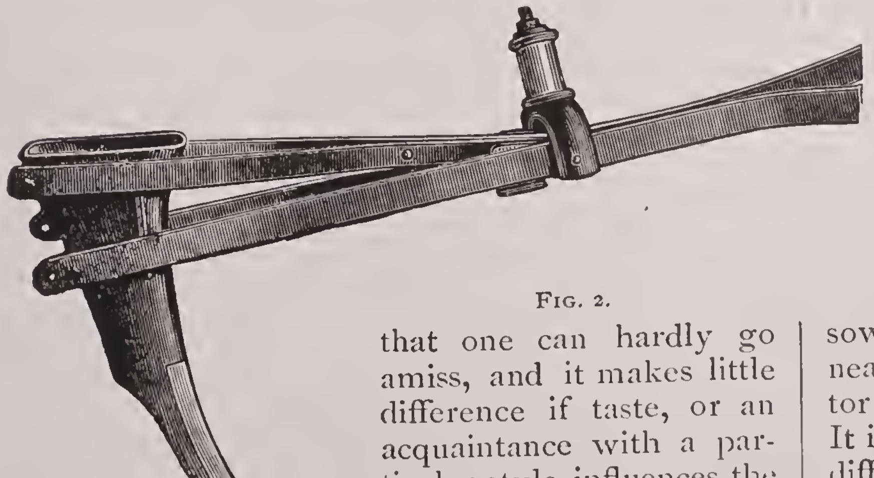


Fig. 2.

The engraving (Fig. 1) represents the new "Buckeye" force-feed grain drill, manufactured by P. P. Mast & Co., Springfielh, Ohio. It has India-rubber spring hoes (Fig. 2), with attachments for all the purposes of sowing and cultivating. It is also furnished with an entirely new arrangement for raising the hoes out of the ground. Instead of lifting up, a lever is arranged which pulls them from a perpendicular position downward. By this means the hoes are raised very much more easily and quickly than heretofore. A quadrant with notches is provided, so that the hoes may be raised only part way if so desired.

The scale for the quantity sown, with the indicator (Fig. 3) which operates the feed gauges, and shows how much seed has been sown, is placed on the rear of the grain hopper, near the right hand-end, thus enabling the operator to quickly change the quantity if he so desire. It is sometimes desirable to change the quantity for different parts of the same field, owing to differences in the soil. The indicator is so arranged that such changes can be quickly and easily made.

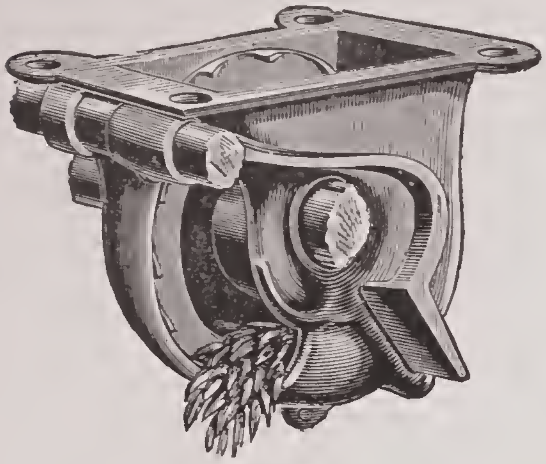


Fig. 4.

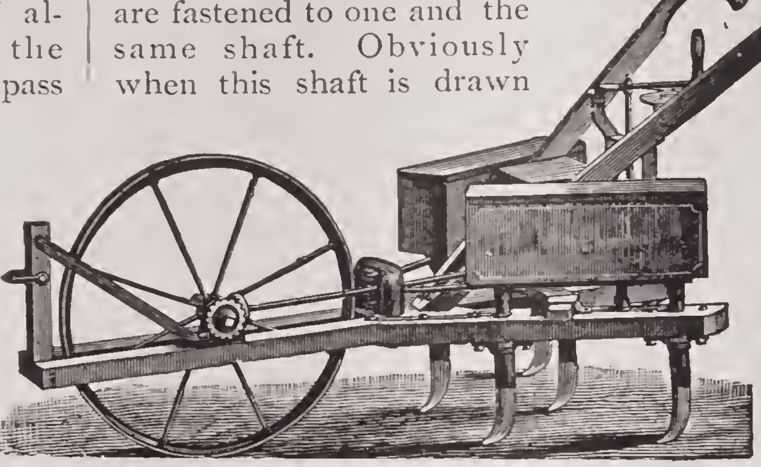


Fig. 7.—*One-Horse Drill.*

One of the great improvements that has been made during the last few years is in the accuracy and uniformity of the sowing. Instead of the old mode of allowing the seed to pass through the machine merely by its weight, the "force-feed" (Figs. 4 and 5) is used, which carries it through with precision. The force-feed used with this drill is the usual cup or case, in one side of which is placed what is called the feed wheel. It is a disk upon which is a ledge or rim, the outer edge of the disk being provided with teeth which assist in carrying the grain out. This feed wheel is made to revolve by a shaft, which shaft is of such shape as to prevent any lost motion. The device for varying the quantity sown without change of gears, consists of a feed-regulating gate, having one end inserted and arranged to slide through a slot in the side of the feed cup or case, the gate being made of such form and so arranged as to slide into and across the grain passage or channel at a point a short distance in advance of its mouth or delivery, in such manner as to diminish the size of the passage at that point, thereby limiting the outward flow of seed to a greater or less extent as occasion may require. All these feed-regulating gates are fastened to one and the same shaft. Obviously when this shaft is drawn endwise by the indicator all the gauges are drawn at once, so that all feeders sow exactly alike. The quantity sown can be varied as little or as much as may be desired, and when set to sow a certain quantity will always sow that quantity accurately. A reduced size of this force-feed is adapted to sowing grass seed. In the end of the hopper is an apparatus which indicates the amount of land which the machine has sown for that setting. The hopper is so arranged that all the seed will be fed out clean; and there is also a hopper for sowing fertilizers.

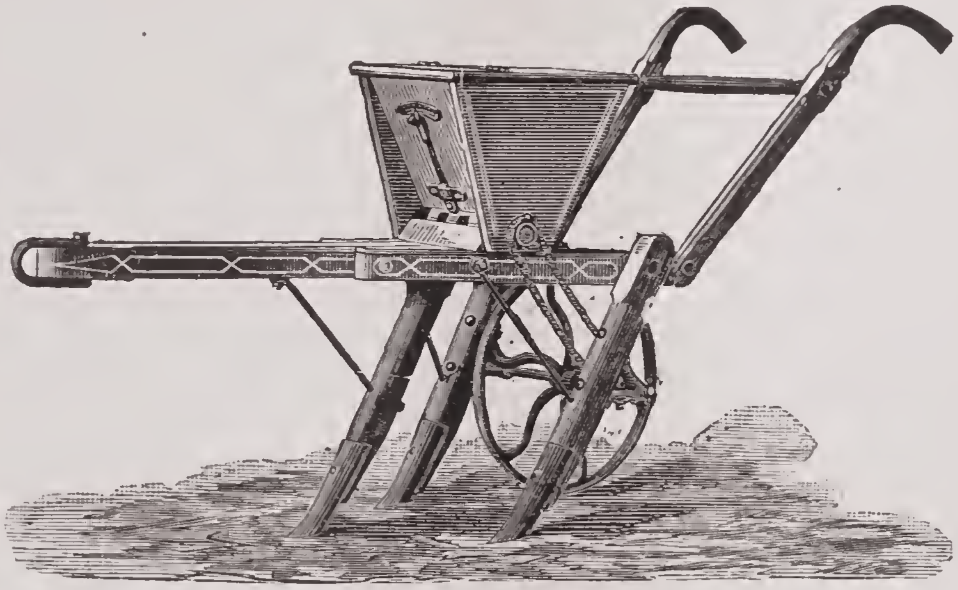


Fig. 6.—*One-Horse Drill.*

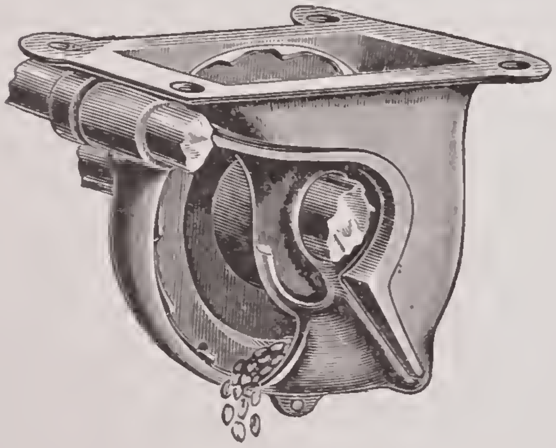


Fig. 5.

A one-horse drill (Fig. 6), made by Mast & Co., has three hoes, for drilling among standing corn; has also the force-feed. At least one-fourth more wheat can be grown on corn ground by seeding early with the drill, than by waiting until the corn is cut and out of the way. The usual rotation system, therefore, calls for a drill of this kind. Ewald Over, Indianapolis, Ind., also makes a fine drill (Fig. 7) for this purpose, with either three or five hoes. But it is

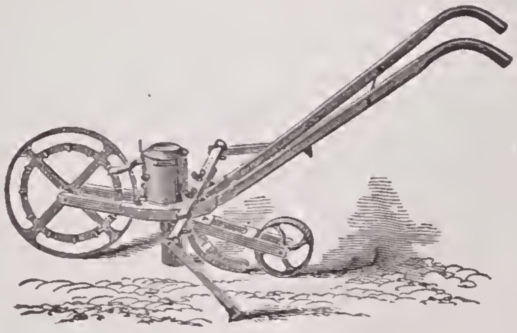


Fig. 8.—*Hand Drill,*

also good enough for sowing any kind of cereal grain.

For garden purposes the Matthews hand drill (Fig. 8) is as good as any. We know that a poor drill is worse than useless, and that many are so made as easily to get out of trim. Some men, too, are rough in the handling of tools, and will blame the manufacturer instead of himself; but alas! he scarcely ever knows that by so doing he injures himself more than any one else. The Matthews hand drill is supplied to the market by Messrs. Everett & Small, Boston, Mass. It opens the furrow, drops the seed evenly at the required depth, covers and rolls the soil; at the same time marking the next row parallel with the one planted. Among the seeds to which this drill is fitted are beet, carrot, pea, bean, corn, sorghum, onion, parsnip, turnip, etc. An indicator has the names of these different seeds, and it is necessary only to turn the hopper to the name. There are no cams, gears, springs or belts to get out of order, and yet the quantity of seed is accurately gauged.

Drinks. See the respective beverages. A list is given on page 85 under head of Beverages.

Driving, urging forward domestic animals, whether in travelling or working. This is often done in so bad a manner as to involve great cruelty to the animals and much loss to the owners. Cattle when brought out to be driven any considerable distance to market, ought to have very little undigested food upon their stomachs; and, when upon the road, they ought to travel leisurely, and never be driven into either fatigue or excitement, never seriously heated, never much urged, never beaten, never allowed to make any spontaneous run or hasty movement, never overgorged with food, and always, as nearly as possible, maintained in the same cool and easy condition as if they were moving about in their summer pastures.

Sheep, when about to be driven to market, should be selected, turned upon a piece of coarse dry pasture, examined in their hoofs, and ochre-marked on the shoulder, rump, or other parts of the body; when collected for the road, they should be in a medium state between repletion and hunger; and, when on their journey, they should be driven slowly and coolly, three or four miles the first day, and should be restrained and controlled by an experienced and cautious dog, and should enjoy, during the long travel, a daily rest in an ample and quiet piece of pasture.

The driving of pigs is difficult and very tedious. The utmost patience and good sense are required to drive them without injury.

HOW TO DRIVE HORSES. The art of driving horses properly is not thoroughly understood, even by those who constantly handle this noble animal. Farmers often fail to realize the great profit and pleasure from their horses simply on account of bad handling in the harness. The art of driving, whether for pleasure or work, demands a clear understanding of the requirements of each particular case, and attention to every motion of one's horse. Pleasure horses are required to travel actively, evenly, safely, and with as much style as possible; while work horses are required to throw their weight into the collar, and with a steady, even pull, without swerving to the right or to the left, and without fretting or noticing what is going on about them, to keep up a uniform motion of their load, at no time losing the assistance of its momentum, and never unnecessarily wasting their strength by a sudden, rapid pull. The ability of the horse to assume one or the other of these characters depends even less upon his own nature than on the manner in which he is driven.

In PLEASURE DRIVING the seat should be rather high, so that one may easily see over the dash-board of the carriage, but low enough for a direct pull on the bit when it is necessary. The feet should be firmly planted (avoiding an ungraceful or studied attitude), in such a manner as to give strength to the pull, and security to the position, in case of a sudden jolt of the carriage. The legs and hips should be as firm and immovable, and the upper part of the body should be as free and flexible, as possible, the principle being borne in mind, as in the case of riding on horseback, that while the seat should be perfectly secure, this security should not imply the least support from the reins, nor the least inability to do whatever may be necessary with the head or arms.

The eyes of the driver should be always on his horses, yet always about him. While he should see every strap and buckle within eye-shot, every movement of the horses' ears, every toss or shake of their heads, and every step that they take, he should also see every vehicle coming toward him, every object by the roadside, or elsewhere, which can possibly frighten his team, and every stone or uneven place in the road on which they are likely to step, or which may come in the way of the wheels. To sit in this manner, and to be thus watchful while driving a pair of lively horses, and at the same time to appear perfectly at ease, is no small accomplishment; still it may be attained by practice, and is essential to elegance in driving.

HOLDING THE REINS. The manner of holding the reins should depend on circumstances. They may be both held in the left hand in either of the following ways, the hand being held with the thumb upward:

First. Let the off rein pass over the fore-finger, and the near rein between the fore and middle fingers, the thumb pressing on the off rein to keep it in place, and both reins passing out between the ring and little fingers. In this way they can be held very securely.

Second. Let the near rein pass under the little finger, and the off rein between the ring-finger and little finger, both ends being brought out between the thumb and fore finger, falling over the knuckles, and being secured by the pressure of the thumb; this is a lighter hold than the former, and is better for driving perfectly trained horses which require only the least touch to bring their heads into the proper (perpendicular) position. It is more fatiguing than the first described, with horses which are at all hard on the bit.

When it is desirable to hold the reins in both hands, the off rein may be taken in the right hand, by passing the fore-finger under it, and allowing it to fall down through the hand, and out between the ring and little fingers; this will admit of the hand being opened to take the whip. The rein in the left hand may remain in the same position as before. If it be necessary to strike a severe blow with the whip, the rein should be passed into the left hand, and quickly regained after the blow has been struck; this manner of holding the reins will give the greatest possible power over the team. The whip should be taken from the socket only when there is occasion to use it, and it should be returned as soon as it has become unnecessary. While held quietly in the hand it should lie horizontally across the near rein, and pointing over the whiffle-tree on the near side.

DRIVING A SINGLE HORSE is not at all difficult, and it requires only a good hand, a good temper, and a watchful eye. The horse's mouth should be lightly felt, that he may be supported if he trip; and especially in going down hill, the driver should sit with his feet well braced and his hand ready to support the horse in a false step, which, if at all, is most likely to occur at this time. Driving a pair of horses requires much more skill and care.

IN DRIVING A PAIR, the great art consists in putting them together so as to draw equally, and to step together. To do this well, the horses must match in action and temper, two slugs being much better than a free-tempered horse with a slug; because, in this case, the whip applied to the one only makes the other more free, and as a consequence it is impossible to make them draw equally. In some cases where two horses are exactly equally matched, the coupling-reins must both be of equal length; but this is seldom the case; and when they do not do an equal amount of work, the coupling-rein of the free one must be taken up, and that of the idle horse let out. In watching the working of the two horses the pole-pieces should always be the guide; and if both are slack, with the end of the pole steady, and neither horse shouldering it, the driver may rest contented that his horses are each doing his share; if, however, the pole is shouldered by either, that horse is a rogue, and is making the other do more than his share, keeping the pole straight by the pressure of his shoulder, instead of pulling at the traces. On the other hand, if either horse is pulling away from the pole, and straining at the pole-piece, he is doing more than his share, and his coupling-rein must be taken in accordingly. Sometimes both shoulder the pole, or spread from it, which are equally unsightly habits, and may generally be cured by an alteration of the coupling-reins of both horses, letting them out for shouldering, and taking them in for its opposite bad habit. The reins are held in the same way for double-harness as for single. In driving a pair, it should always be remembered that there are two methods of driving round a curve, one by pulling the inside rein, and the other by hitting the outside horse, and these two should generally be combined, graduating the use of the whip by the thinness of the skin of the horse. In all cases the whip is required in double harness, if not to drive horses when thoroughly put together, yet to make them pull equally; and there are very few pairs which do not occasionally want a little reminding of their duties. A constant change from one side to the other is a prevention of those tricks and bad habits which horses get into if they are kept to one side only. The driver should, therefore, change them every now and then, and back again, so as to make what was a puller from the pole, rather bear toward it than otherwise when put on the other side.

There is a certain animation of manner on the part of the driver which, without being noisy or demonstrative, keeps a team lively and cheerful at work, while another driver would not be able to get them to nearly so good a pace with even more labor to himself, and more fatigue to them. To attain this correspondence with one's horse should be the object of every person who attempts to become a fine driver.

Horses with hard, dead mouths require the greatest skill and management to draw tolerably, and should not be curbed up tightly, as that will tend to increase the difficulty. To ride or drive horses with pleasure and advantage, you must have a light finger and play with their mouths with skill and humor. Some horses have a trick of getting the check of their bit into their mouths; this is very dangerous, and should be prevented by a washer or round piece of leather.

The most dangerous horse in a team is a stiff-necked one, which, in going down hill, instead of inclining his head toward his partner, and throwing out his quarters so as to hold back the coach, twists his head another way, looking over one shoulder, and with the other shouldering the pole or his partner. When you have one of this sort you can do nothing with him by pulling up, but must whip his mate up to him, and if that does not answer, cross the road quickly with the leaders, to prevent running off to the side to which he is pushing.

If your horses are nervous and fidgety, they will not bear being confined too tightly at first starting, but must be humored and allowed some length of chain, particularly if the road be rough and full of ruts. When there are no breechings the horse requires to be nearer to the pole, or in holding back, his collar will get too far forward, unless restrained by a false martingale. Some object to breechings as being troublesome to horses in hot weather, but they are almost indispensable in hilly countries, as they enable the horse to hold back with less strain on his back and legs, and add greatly to the security of both team and vehicle.

The draft of the leaders will be greatly equalized by crossing the inside traces, fastening that of the near horse to the whiffle-tree of the off side, and that of the off horse to the near whiffle-tree.

The great art in driving four-in-hand is to favor the peculiarities of the different horses of the team. It is not often that all four will draw equally at all times, nor is it desirable that they should do so. By allowing first one and then another to slacken his pull, the team will be able to do more in a day than if all were always pulling. Some horses will naturally draw at their best on starting off, and will work with less energy after a few miles, while others will hang back at first, and come in to their work as they get warmed up. By consulting their inclinations, the driver may economize the strength, and preserve the temper of his team, so as to secure a greater amount of work with less effort than if he kept the sluggard up to the bit from the start, and restrained the early ardor of the more spirited animal.

In turning corners, draw the leaders around first and let the wheel horses follow as nearly as possible in their tracks—not turn at the same time.

On ascending ground, the leaders should do more than half of the work, to compensate the wheel-horses for their extra effort in holding back when going down hill.

Driving Working Horses differs from pleasure driving, as much as does its object. One of the prime objects in pleasure driving that must be borne in mind is a regard to style and to appearance, while teaming or business driving has for its main object the best economy of the strength of the team, and its application to the performance of labors. It is true that a teamster may have a just pride in the appearance and style of his team, but this should always be subordinate to their usefulness; and the main problem which he has to solve is, how to turn a certain amount of invested capital, and a certain amount of hay and grain to the best account, in performing the work in which he and his team are employed. To accomplish this, having the horses fed in a manner to give them the greatest possible strength and health, and so groomed that their systems are in the best condition for appropriating the nutriment of their food, he should keep the following rules always in view:

1. The load should be just what the horse or the team can move steadily alone, neither so light that they are occupying their time in going over the road with less than they can draw, nor so heavy that they must overtax their strength to draw it, or stop to take breath and to recover from the effects of too hard a strain; in short, they should do all that they can do comfortably,—never much less, and never any more.

2. Horses will work better if they are kept well up to the bit, not sufficiently to pull on it, but just enough to feel its effect and to receive its support in case of a false step, than when allowed to become negligent and and careless in their gait.

3. When there are two or more horses in a team they should be so harnessed as to draw exactly alike. This requires them to be of uniform dispositions, and in equally good training; any deviation from this will cause one horse to do more, and another less, than his share of the work.

4. Working horses should never be whipped while drawing, except it is absolutely necessary; and then they should not be simply tapped, but smartly punished in a manner that will cause them to understand and to recollect that their driver really means that they shall work, and work properly.

5. If necessary to stop to rest before going up a hill, let the halt be at a little distance from the foot of the hill, that they may not get in the habit of stopping just at the foot of every hill which they encounter. When they are fully rested and prepared to go on, let them move vigorously, but do not allow them to rush at the hill; they would in such a case lose more in wind than they would gain in impetus. If possible, go moderately up every hill without stopping, recollecting that it is much harder to start a load against a hill than it is to keep it in motion after it is started. At the top of every difficult hill, either stop the team or let them walk slowly for a few rods, until they have recovered from the effects of the extra exertion.

6. At all times, and especially in difficult places, or when first starting with a heavy load, the driver should carefully avoid exciting his team by crossness or impatience, but should hold them steadily by the bit, and talk to them in a quiet and determined manner, endeavoring to keep them cool and resolute, pulling evenly and steadily until they start their load, without making a sudden jump at it, as many nervous horses are inclined to do. Such a movement is very likely to disconcert the other horses, and it exhausts the strength more than ten times the effort properly expended.

7. In descending a hill, especially if there be no break or drag on the wheels, the team should be so held back that the wagon never gets an increasing speed, and the pole should be kept in an exact line with, and not diagonally across, the wagon.

8. The team should never be so hardly driven as to become blown (where it is possible to avoid it), nor should they ever be allowed to become indolent, or careless in their gait. They should always be active and willing, but never impatient to do more than is clearly within their powers.

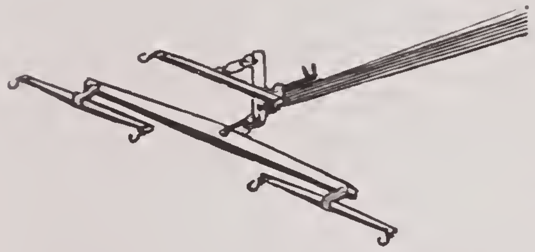
A road team, well kept, and driven according to the above directions, will last longer, keep in better condition, and do more work than horses managed by the ordinary system, and in the hands of persons who are either not able or not willing to give any thought to the matter.

Plowing. Plowing on rough ground, with horses which are fit for anything else, is, at best, a painful necessity. There is occasionally to be found a stylish carriage team, or a pair of fast trotters, which will work like oxen at the plow; but generally horses of spirit will become impatient under the frequent interruption caused by stones, or by the frequent turning necessary in small fields, while the harness generally used for this work is neither comfortable nor complete. In large fields, free from obstructions, horses may very properly be used, as they are more pleasant to work with than oxen; but in rough work the latter are preferable, being by temper and structure much better adapted to such work than horses.

Horses are frequently driven to the plow with a single line, or with a pair of lines fastened to the outer rings of each horse's bit, the inside rings being connected by a short line passing from one to the other. This will do very well for quiet, well-trained animals, in good ground; but with horses at all inclined to be unruly or impatient, or working in soft or stony ground, we should use the same sort of reins as in driving on the road, thus giving a fair hold of each horse's head.

Horses used for this work should be taught to stop instantly at the word, to start promptly and together, and to pull evenly. The team should be brought quickly around at the turns and headlands, and made to take their places as actively as possible for the new furrow; but they should not be started, if at all blown, until they are fully ready to go to the end of it without stopping, unless, indeed, it be a very long, or a very hard one.

We illustrate by the annexed engraving a good form of whiffle-tree for three horses plowing abreast.


Whiffle-tree for Plowing Three Abreast.

It is the opinion, apparently a good one, of the best farmers of the present day, that no two horses are strong enough to turn such a furrow as is necessary for the proper cultivation of the soil, and they recommend that three or four be used. Assuming this to be the case, it should be remembered that three horses working abreast will pull nearly as much on a plow as will four geared in the ordinary way—that is, the third horse, from being fastened within three or four feet of the plow, would have nearly as much power to draw it as would two horses drawing it from a distance of from 15 to 20 feet. See Plowing.

Driving-Wheel, in farm machinery, is the large wheel which runs on the ground and propels the machinery.

Drop to Wing. In hunting a dog is said to "drop to wing" when he suddenly crouches as the bird he points at takes to flight.

Dropsy, a morbid condition of the body which fills it up with a watery fluid. Diuretics, described under the head of Urine, are valuable in this disease. Keep the bowels open with some mild physic; give the lobelia emetic three times a week, together with a vapor or a Turkish bath. Place the patient in bed, and construct a frame so as to keep up the bed clothes. Produce a vapor by burning spirits, and conduct the vapor, by means of a tube, under the clothes. Let the patient remain in this vapor bath an hour; between giving the vapor and emetic, give an injection of pennyroyal tea: put in a teaspoonful of lobelia and as much cayenne. Cream of tartar dissolved in water, and taken every day, is very useful. Exercise is of the first importance; the patient should sleep on a hard bed and in a dry room. Let the body be rubbed morning and night with a coarse towel or flesh-brush; wear flannel next the body constantly; abstain as much as possible from drink, and let the food be light, and rather stimulating.

Drowning. Actual death by drowning is often preceded by apparent death, and it is possible, if this state has not continued too long, to resuscitate a person thus apparently drowned. The method of treatment for the recovery of a person in such a state is as follows: Avoid all rough usage. Do not hold the body up by the feet, nor roll it on a barrel or log to get the water out of him. There is no water there beyond the mouth. The life has been rolled out of many a poor victim over a barrel, under the misguided delusion of "getting the water out of him." Do not get a bellows and blow him full of wind. He does not need inflation. Begin the work of resuscitation by attempts to arouse the patient, who must not be removed unless there is danger of his freezing; but his face should be exposed to the fresh air, the mouth and nostrils wiped dry, the clothing quickly ripped open so as to expose the chest and waist, and two or three quick, smart slaps given upon the stomach and chest with the open hand. If the patient should not at once revive, a bit of wood or cork is placed between his teeth to keep the mouth open, and then turned upon his face, a large bundle of tightly rolled clothing placed beneath the stomach, and the operator should press heavily upon his back over the bundle for half a minute, or as long as fluid flows freely from his mouth. (See Fig. 1.) The mouth and throat should then be cleared of mucus by introducing into the throat the end of a handkerchief wrapped closely around the forefinger; the patient then turned upon his back, under which the roll of clothing is placed so as to raise the pit of the stomach above the level of any other part of the body. If an assistant is present, he should hold the tip of the patient's tongue, with a piece of dry cloth, out of one corner of the mouth, thus preventing the tongue from falling back and choking the entrance to the windpipe, and with the other hand he should grasp the patient's wrists and keep the arms stretched back over the head, which increases the prominence of the ribs and tends to enlarge the chest. The operator should then kneel astride the patient's hips and press both hands below the pit of the stomach, with the balls of the thumb resting on each side of it, and the fingers between the short ribs, so as to get a good grasp of the waist. (See Fig. 2.) He should then throw his weight forward on his hands, squeezing the waist between them with a strong pressure, count slowly one, two, three, and, with a final push, let go, which springs him back to his first kneeling position. This operation, which converts the chest of the patient into a bellows, is continued at a rate gradually increased from four to 15 times in a minute, and with the regularity observable in the natural motion of breathing which are thus imitated. If natural breathing is not restored in two or three minutes, the patient should be turned a second time upon the stomach in an opposite direction from that in which he was first turned, the object being to free the air-passages from any remaining water. The artificial respiration should then be resumed and continued if necessary from one to four hours, or until the patient breathes; and when life appears the first short gasps are carefully aided by the same method. From the first, if assistants are present, the limbs of the patient should be rubbed, always in an upward direction toward the body, and with firmness and energy, the bare hands being used, or dry flannels or handkerchiefs, and the friction kept under dry blankets, or over dry clothing. The warmth of the body should be also promoted, whenever possible, by the application of hot flannels to the stomach and armpits, and bottles or bladders of hot water, or heated bricks, to the limbs or soles of the feet. As soon as breathing is established the patient should be stripped of all wet clothing, wrapped in blankets only, put to bed comfortably warm, but with a free circulation of fresh air, and left to perfect rest. For the first hour a little hot brandy-and-water, or other stimulant, is given every ten or fifteen minutes, and as often afterwards as may be expedient. After reaction is established the patient is in great danger of congestion of the lungs; and unless perfect rest is maintained for at least 48 hours he may be seized with difficulty of breathing, and death ensue if immediate relief is not afforded. In such cases a large mustard plaster is placed upon his chest, and, if he gasps for breath before the mustard takes effect his breathing is assisted by the careful repetition of the artificial respiration. It is necessary that everybody should know that death occurs in drowning because the water prevents the entrance of air into the lungs; the small quantity of water which gets into the lungs is of no consequence, and still less that which passes into the stomach, which occurs during life, or if the body be not drowned alive; consequently, the direction sometimes given in the old books, of holding the head down, in order to draw off the water, is not only useless, but positively hurtful; but if death occurs from want of air, it is obvious that the thing needful is to restore air to the lungs as fast as possible; and this is done by artificial inflation.

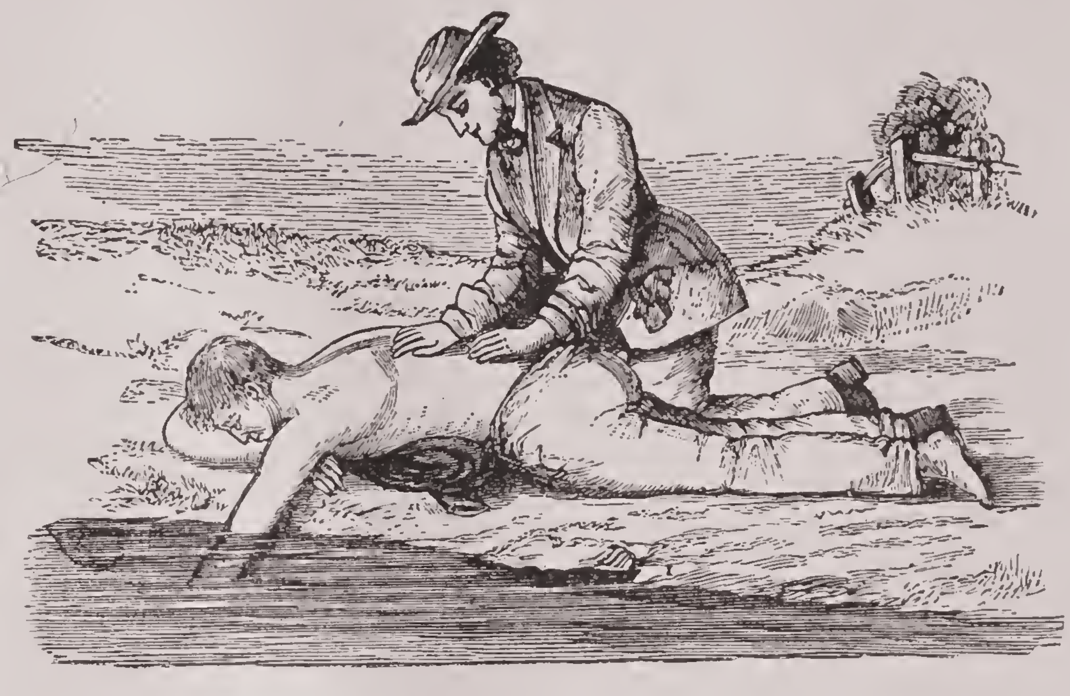


FIG. 1.—*The First Step Taken, by which the Chest is Emptied of Air and the Ejection of Fluids is Assisted.*

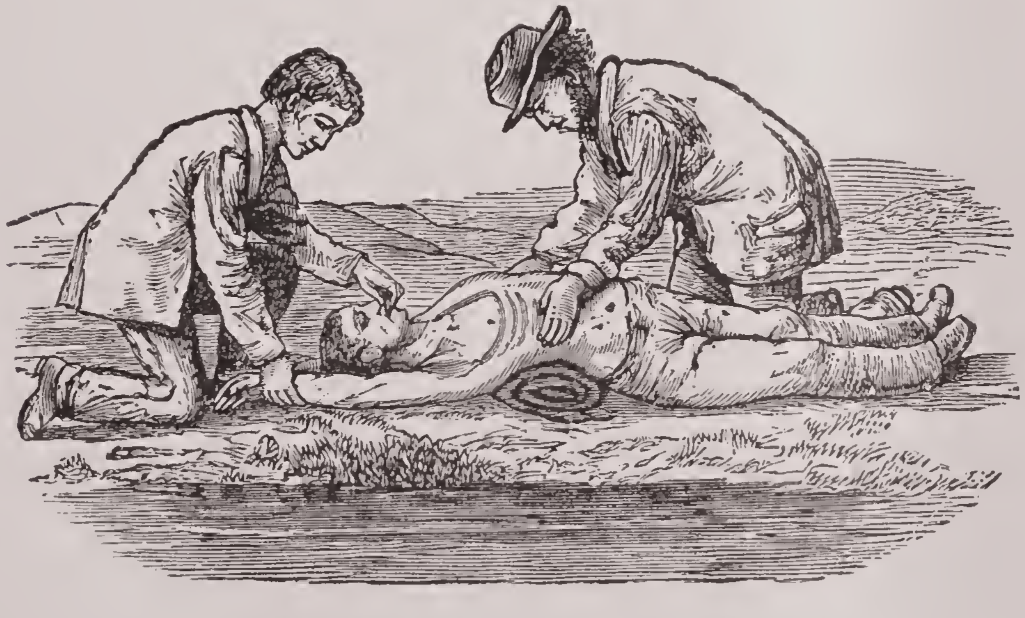


FIG. 2.—*The Position and Action of the Operator in Producing Artificial Respiration.*

Another mode of resuscitating a drowned person is, as given by some, as follows: If the person has been drowned but a short time, or there is the least hope of restoring him, he should be placed immediately in such a position as will best allow the water to pass out, or will force it out of his lungs and throat; then wipe the body dry, wrap in warm blankets, and place in a warm, dry and well ventilated room; or, if the weather is warm and the sun shining, place the body in the sun, with his face turned toward it. The whole surface of the body should now be thoroughly rubbed with the dry hands, by stout, strong persons, perseveringly; if the patient is in bed, hot bricks, stones, or bottles of hot water should be applied about the body, legs and feet, and every means possible used to restore natural warmth to the body. At the same time, means must be used to inflate the lungs. Hold the nostrils tight and let some one blow strongly in the mouth of the patient, forcing air into the lungs; then press gently on the lower part of the breast, stomach and region of the lungs, to force out the air again; continue this as long as there is any hope or prospect of restoration.

To Save a Drowning Person. The one point to especially guard against in attempting to save a person from a watery grave, is to prevent the victim from clutching you in such a way as to rob you of your power to swim. A drowning person will instinctively clutch at the nearest object with the greatest vigor, and often he will grasp his rescuer in such a way that both go down. So, be cautious in approaching a person to save him. Seize him from behind, if possible, and push him in front of you, or catch him in such a manner that you will be able to hold him at a distance. If the distance to the shore is great one should seize him by the foot and drag him, turning him on his back. Better use violence in making him defenseless, or wait until he becomes exhausted, rather than permit a strong man to grasp you; should he, however, succeed in fixing his grasp, the only remedy is to dive, when, finding himself under water, he will loosen his hold, thus permitting his rescuer to take a better position. Keep cool; act with firmness and decision.

Should a person accidentally fall into the water and be unable to swim, he should retain his presence of mind. In the moment of terror, a person thrown into the water almost instinctively stretches out his hands to grasp at some object. Now, the fact is that the human body is very little heavier than the volume of water it displaces; therefore, if the hands are kept under water and in slight motion, and the lungs filled with air, one may float securely in water for some time. Yet in most cases people who are not swimmers immediately raise their hands above their head and scream the moment they find themselves in deep water. The folly of such action can be impressively illustrated by means of a half empty bottle and a couple of nails, and the experiment should be repeated in every household until all the members—particularly the women and children—realize that the only safety in deep water lies in keeping the hands under and the mouth shut.

Any short-necked, square-shouldered bottle will answer, and the nails can be easily kept in place by a rubber band or a string. First, balance the bottle with sand, so that it will just float with the nails pointing downward, then by turning the nails upward the bottle will be either forced under water at once or will be tipped over so that the water will pour into the open mouth, and down it will go. To children the experiment is a very impressive one, and the moral of it is easily understood. The value of this precaution was strikingly illustrated near Accomac C. H., Virginia. A little girl, while bathing, was swept off into the ocean by a strong current and soon disappeared in the high breakers. As she could not swim her companions gave her up for lost. Two young fishermen who were employed some distance away thoughtfully set out with a small boat in search of her, and when a mile or more from shore, found her floating on the water. She had been drifting nearly an hour and was greatly exhausted, but soon recovered. Unable to swim she had pluckily floated, thereby making her rescue possible.

Cramps. Perhaps more good swimmers have lost their lives by cramps than anything else, and only those who have suffered from it can conceive its fatal power. The usual spot where the cramp is felt is in the calf of the leg just below the knee, and it sometimes comes with such violence that the muscles are gathered up in knots. There is only one method of proceeding under such circumstances: Turn on the back at once, kick out the leg in the air, disregarding the pain, and rub the spot smartly with one hand while the other is employed in paddling toward the shore. These directions are easy enough to give, but difficult to be obeyed. Cramp seems to deprive the sufferer of all reason for the time and to overpower him with mingled pain and terror. Still there is no other hope of reaching shore than that which is here given. The causes for cramp are generally two-fold. The principal cause lies in indigestion, for it is seldom that a person in really good health is attacked by this malady. The second is over-exertion of muscles that have been little used, and therefore too strong a leg-stroke should always be avoided. Should you see a swimmer struggling in the water, the chances are one hundred to one he has been attacked with cramp; therefore, go to his rescue without a moment's delay.

Drum, in machinery, a revolving cylinder around which belts or endless straps are passed to communicate motion.

Drunkenness, To Cure. A mixture made up as follows, and taken in quantities equal to an ordinary dram, as often as the desire for strong drink returns, is said to cure the worst case of drunkenness: Sulphate of iron, 5 grains; peppermint water, 11 drachms; spirits of nutmeg, 1 drachm. Another method is to let the patient eat or drink nothing that is not saturated somewhat with liquor until he is "sick" of all such victuals and drink. Some parties advertise that they will cure the disease or habit of drunkenness for a fee; and, as there are millions of ways in which the alcoholic appetite may be met and satisfied with vegetable drugs, the field for their operations is sufficiently large. They often succeed in effecting a cure, for the principal thing a drunkard needs is to become a slave to some friend who will force him through some course of treatment. The sober element of society generally would prescribe total abstinence and steady work.

Dry Earth-Closet: see Privy.

Drying. Preserving fruit by drying is a method as ancient as the growth of fruit. Until the modern way of canning was invented, there was no other method of converting fresh fruits into long-keeping goods, suitable for distant transportation and commerce throughout the world. By this means figs, dates, prunes, currrants, and raisins are prepared. Sun-drying is practiced largely in this country. In the Southern States, notably, drying fruit is quite an industry. The product is sold or bartered at country stores, shipped to eastern houses, and exported to

Europe. All over the Eastern, Middle and Western States, where fruit is raised, sun-drying is practiced, but by different methods. In New England, apples are pared, quartered, cored, strung with a needle, and hung out in the sun or around the kitchen stove to dry. This practice is somewhat common in the Middle and Western States, but in other sections, instead of strings, boards or dishes are more often used, and the apples are thinly sliced and spread on the surfaces. When a particularly fine article is desired, the fruit is placed in the sunlight, between muslin sheets, and dried. This keeps away insects, dust, etc., and gives a finer color.

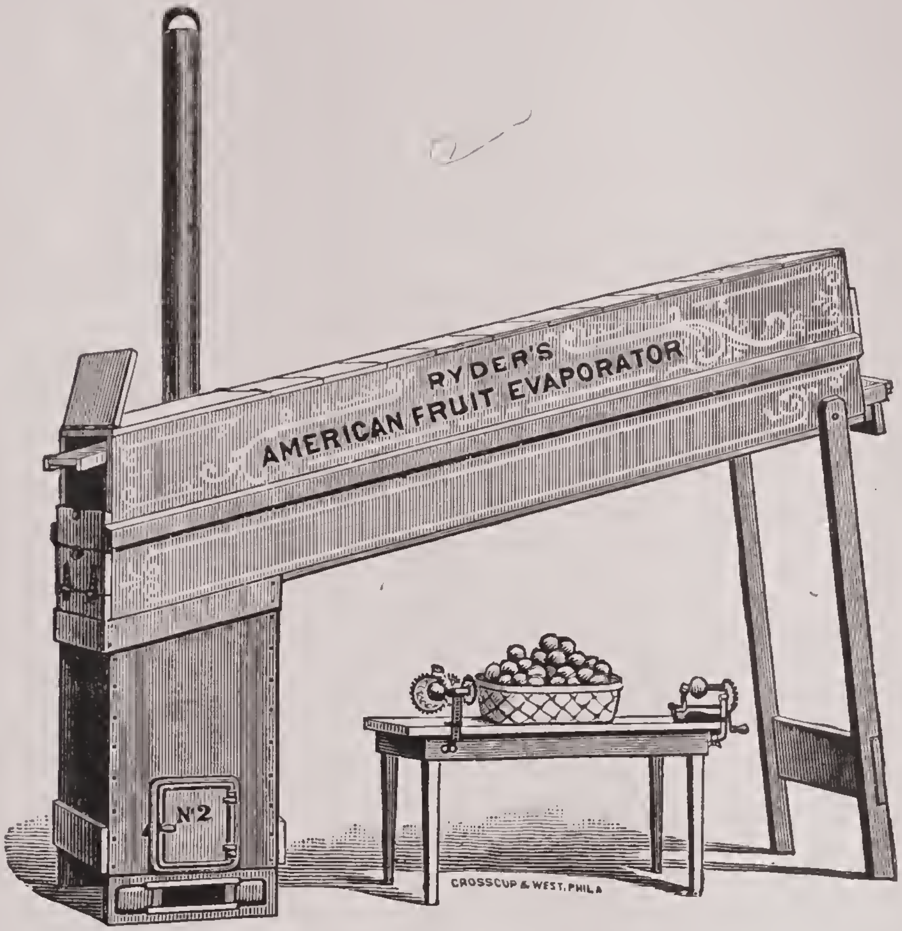


Fig. 1.—*Ryder's American Fruit Evaporator.*

An available method is to dry under glass, by which the hot-bed sash can be utilized. Make wooden boxes or frames to fit the bed, set them up on legs, one pair longer than the other, to get the proper shape. Cut holes at the top and bottom of the box to secure a current of air over the drying fruit. Place the fruit on trays, boards, or dishes in the box or frame, and put on the sash. Leave in the sun till the fruit is sufficiently dry to be packed in boxes, barrels, or sacks. This method keeps out all dirt or invasion by birds and insects, and requires less care than any other. Drying in stoves is attended by inconvenience and scorching, but can be practiced in cold weather for the saving of fruit liable to decay.

Artificial heat has now become the sole means for drying, in large establishments or by persons who dry for market. By this method only a few hours are necessary; birds, insects, dust, and storms are excluded, and the fruit retains color and taste.

An efficient and not costly home dryer is made in the following manner: Take a hogshead and saw a door in the side of it to admit the stove and fuel for feeding it; cut a hole in the rear top for the pipe, carrying the pipe above the drying-box on top. Saw an 18-inch square hole in the head of the hogshead. Take a box—any one large enough that is handy—knock one end out; nail cleats to the sides for perforated drawers or shelves to hold the fruit. Convert the top of the box into a door, with a button or strap to fasten it. Coal or wood may be used, and a very hot fire is not desirable. The door should be left open to provide air for the stove. With this arrangement the drying of apples, peaches, the small fruits, wild berries, plums, etc., is an easy task. The color and the flavor of the fruit will be improved by keeping a dish of water on the back of the stove, to furnish moisture for the heated air. The box need not be tight. There should be a few auger-holes in the top to induce a current of hot air through the fruit. Vegetables can be dried by this method as well as fruit.

An iron drying-machine on the above principle, costing about $75, is in use. It is portable, and may be used indoors and out. It will dry as much fruit in one day as a whole family can prepare in the same time.

The later method of pneumatic evaporation has become extensively adopted among large fruit-growers and dealers. Of the different varieties of this method, the first in use is the Alden process. The description of this will illustrate the principle of evaporating fruits and vegetables. The Alden process consists in exposing fruits and vegetables to the action of rarefied, moist air. The heated air currents move in the same direction with the fruits, etc., which steadily advance into an atmos-

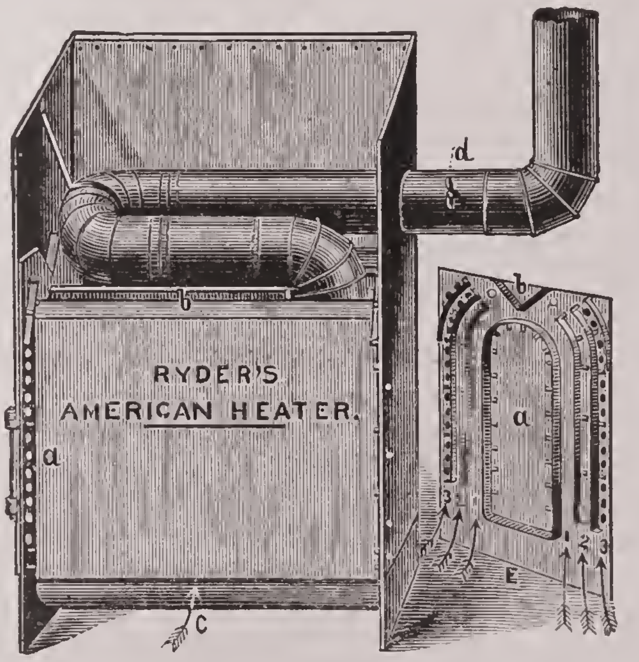


Fig. 2.—*Ryder's American Heater.*

phere constantly becoming cooler and more damp, commencing with 200° to 240°. The effect of this increasing humidity and decreasing heat is to keep moist the surfaces of the articles under treatment, to open their minute pores and cells, and retain them in that condition until the water is evaporated and passes off in the form of warm vapor. This process occupies about two hours for apples.

The effects produced by evaporation are the opposites of the effect of drying. The latter begins by the formation of an external skin, which confines the internal moisture until the cellular structure of the fruit is broken down; it is a process of fermentation or cooking, and makes the fruit leathery and indigestible. Such is the value of evaporated fruit over dried, that, for five years after the process was adopted, the evaporated product sold for 100 to 500 per cent. more than the old-fashioned dried fruit. The cost by the new method is also considerably less than by the old, being about 20 to 25 cents a bushel.

We give an illustration of the American Fruit Evaporator, Fig. 1, made by the American Fruit-Drier Co., Chambersburg, Penn.

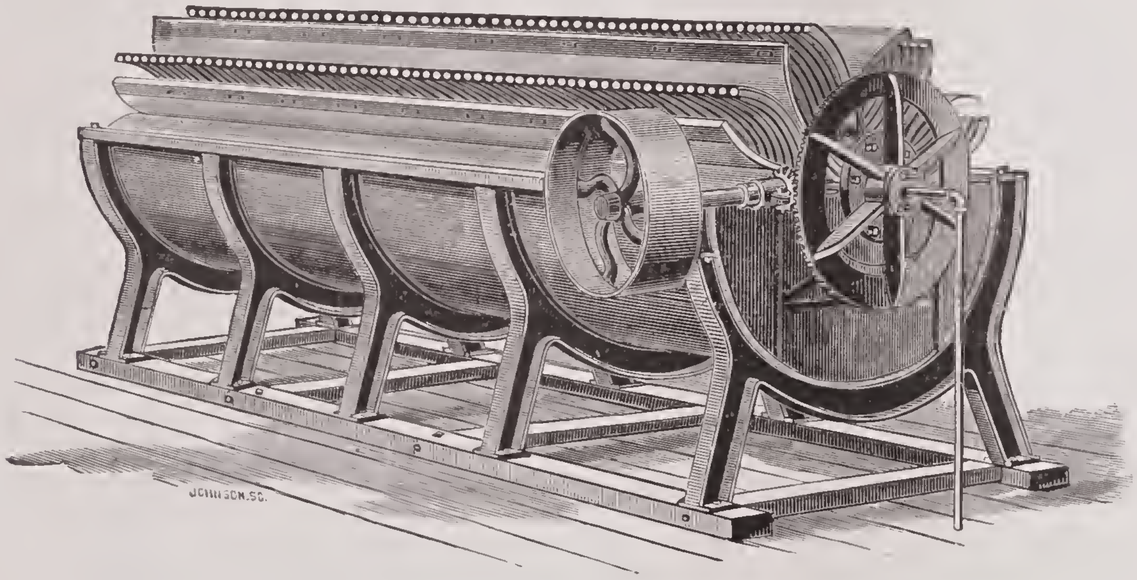


FIG. 3.—*Steam Drier.*

It is 28 inches wide, 9½ feet in length; 4 lines of tags; capacity 12 to 15 bushels per day.

TO DRY CHERRIES. When they are pitted, put them into a porcelain kettle, add to them as much white sugar as will sweeten them nicely; let them come to a boil, then take out with a skimmer and lay on plates. Boil down the juice till it is almost thick, and pour over the cherries.

The smaller and more perishable fruits, such as currants, grapes, cherries, plums and the berries, may be dried in sugar, by preparing the fruit as for canning or preserving. Take five pounds of fruit to one pound of sugar; put in a kettle and boil, stirring at first. As the fruit rises to the top, skim it off; boil the syrup down till quite thick, pour over the fruit, then dry. In sun-drying, the dishes must be covered with musquito netting, to keep the flies off the fruit. In cooking for pies or sauce put in cold water and stew, adding sugar to suit the taste.

Fig. 3 is a cut of the latest improved dryer for grain and meal. It is made by the Nordyke & Marmon Company, of Indianapolis, Indiana.

Dry Rot, rapid decay of timber, by which its substance is converted into a dry powder, which issues from minute tubular cavities resembling the borings of worms: called also "sap rot" and "powder post."

Duck, a very extensive family of water-birds, which are found in all parts of the world.

The Mallard, or common wild duck, which is the original stock of domesticated ducks, appears to have been reclaimed at a very early period. The nest of the duck is usually placed in the most solitary recesses of a marsh or bog, among coarse grass, reeds and rushes, and generally contains from 12 to 16 eggs, of a dull greenish-white. The flesh of the wild duck is held in general estimation, and various methods are resorted to in order to obtain these birds in quantities.

The Muscovy duck is the largest of the duck kind, and approaches nearly to the size of the goose. It has obtained its name from a strong smell of musk, which exhales from its body and not because it comes from Russia, as has been supposed. The Muscovy ducks are damed in great quantities in the West Indies, and are found wild in Guiana, where they nestle on trunks of trees, close to the water's edge. They feed in the morning upon a plant called wild rice, and seldom permit the sportsman to approach within gunshot. The Canvass-back is peculiar to North America, and was known to the epicure long before it was discribed by the naturalist. The canvass-back ducks arrive in the United States from the north in October. When they first arrive they are very lean; but, from the abundance of their favorite food, they become fat about November. They are sometimes found in very great numbers. The Canvass-back is constantly attended by another species, the Widgeon, which manages to make a good subsistence from his labors. This bird is extremely fond of the tender roots of that particular species of plant on which the Canvass-back feeds. The Widgeon, which never dives, watches the moment the Canvass-back rises, and, before he has his eyes well opened, snatches the morsel from his mouth, and makes off. Among other varieties of the wild duck are the Sheldrakes, Shovellers, Summer Duck, Pintails, Gadwalls, Teals, Bluewings, etc.

DOMESTIC DUCKS. This species, in a wild state, always pairs, but in domestication it becomes polygamous, and the care of the young is left entirely to the female. It has been long common in the poultry-yard, being valued for its eggs and its flesh; and there are breeds, as the Aylesbury duck, etc., remarkable for their great size and delicacy of flesh. In situations where they have ready access to a lake, pond, or stream, ducks are easily managed, and very profitable poultry. In other circumstances, they cannot be kept with advantage.

For the table every one is willing to admit the duck's excellence, though the want of cleanliness in its habits meets with everybody's reprobation. As a feeder, it has few equals, while its feathers in the market stand high above those of the hen or turkey and only second to those of its giant companion, the goose.

Ducks are easily hatched, and if properly managed they are easily raised—much more so than chickens or turkeys. Probably the worst thing for ducklings is the first thing they usually receive, and that is unlimited range and water to swim in. The little things are, in a measure, nude, and should be kept in pens with dry soil floors or stone pavement that can be washed down daily. No kind of poultry will succeed on bare boards. All the water they need is best furnished by burying an old pot in the ground and laying a round piece of board on the top of the water with room for the ducks to stick their heads in and fish out the corn that is put in the water. This amuses them and does no harm, while, if allowed to go off to ponds or streams, they are very liable to fall a prey to vermin in some shape, or to get their bodies wet and chilled from remaining too long in the water. Their pens must be kept clean if they are expected to thrive. The young of all ducks are great insect destroyers; hence in the garden or on the farm they will be found to amply pay for themselves. Ducks are also prolific layers, laying about 100 eggs a year. The period of incubation of the duck is from 28 to 36 days, depending upon the season, the variety, and the temperature of the air.

Tame ducks are well known to be greedy, and not nice feeders. They not only eat incessantly all day, but if it is a moonlight night they will up and at it again an hour or two before morning. They require a mixture of animal with vegetable food, being accustomed, in the natural state, to live on worms, which they are always seeking for in water. They will eat flesh and garbage of any kind; but water insects, vegetables, corn, and pulse are their proper nutriment. If fed much upon grain they fatten rapidly, and the flesh becomes delicate, but is apt to be insipid; and if fed too much upon animal food, their taste is strong and more like wild fowl. They require water, and that which is stagnant is best as affording more nourishment from weeds and insects. They are sometimes fattened in coops; but they become of a more delicate flavor, fatten equally well, and are more wholesome by having access to a pond with plenty of food. Their flesh is savory and stimulant, and is considered to be less gross than that of the goose as well as more easily digested.

The character of the duck is quite inoffensive and harmless, and is even distinguished by its social disposition. It is also valuable for its great fecundity, and the cheapness and ease with which it may be provided for, although voracious eaters, as they are.

How to Tell Ducks from Drakes. It is generally supposed that the only distinction between drakes and ducks is that the former have curls on their tails. This is not, by any means, an infallible sign, for some ducks have curls also, while some drakes have none at all. For instance, when a cross-bred Rouen and Mallard duck becomes seven or eight years old she looks exactly like a drake, curl and all. We have known a superannuated duck to be sold for a drake, just because she happened to have a curl on her tail, and had stopped laying, neither buyer nor seller being conscious of the mistake; and the poor duck would have any amount of scolding showered down upon her because she failed in her intended mission. The only true test is to judge by the sound of the voice. Ducks utter a sound very insulting to some medical men—quack, quack, but drakes only make a kind of a wheezing noise, as if suffering from a bad cold, and never say quack. This distinction can be noticed when very young, just as soon as the pinion feathers of the wing begin to grow.

Varieties. The most important varieties of domestic ducks are the Mallard, Aylesbury, Rouen, Musk, or Brazilian duck, called Muscovy and also Guinea duck, the Black East Indian, the Wood duck, the Mandarin, the Pekin and the Black Cayuga duck.

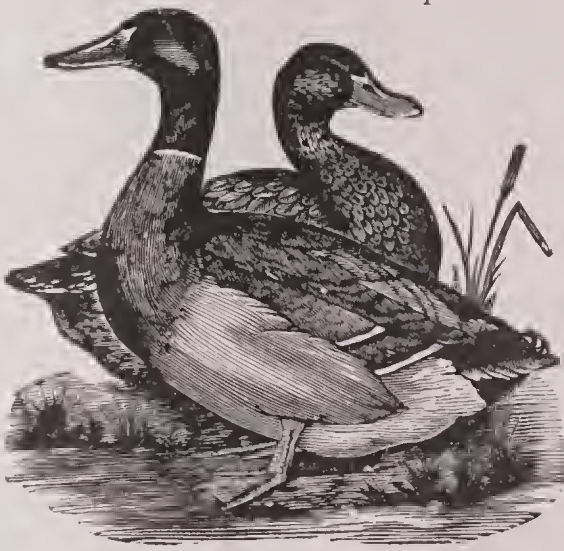


Fig. 1.—*Rouen Ducks.*

The Aylesbury is the largest, except the White Musk, and by far the best white duck. It is distinguished by its large size, its cream-white plumage, and its characteristic light yellow or cream-colored bill and orange legs. When well bred, adult Aylesbury ducks weigh from eight to ten pounds per pair, while the best specimens will reach twelve. It is the great favorite in England. The Aylesbury is a prolific layer, it being not unusual for the duck to lay more than 100 eggs, and in some instances 150, in a single season. The average weight of their eggs is about three ounces. Early-hatched birds sometimes lay in the fall. It is quiet and easily fattened, and fine for the table.

The Black East Indian or Buenos-Ayrean duck, a native of both sections that contribute to its name, is more remarkable for its beauty and excellent game flavor than for its size, being less in size than the Aylesbury. Metallic tints, varying with the light from green to a gilded purple, decorate their form of unform velvet black, their bills and feet being of the same hue. The female has the same general color as her mate, and is nearly as beautiful, while her disposition is far more amiable. These ducks require but common feeding to be fit for the table, their flesh being prized for its high game flavor.

The Mallard duck is only interesting as being generally regarded as the progenitor of our common domestic duck.

It is small, hardy, prolific, dark gray, and is esteemed as a game bird.

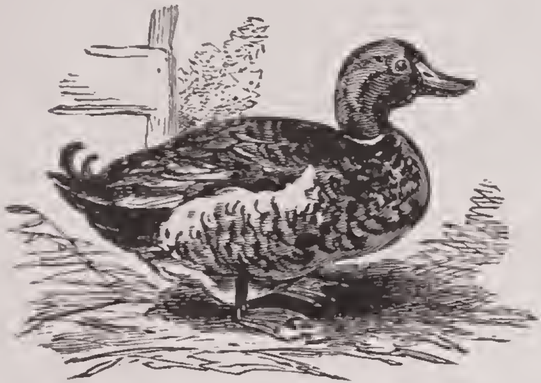


FIG. 2.—*The Common Barnyard Duck.*

The Musk duck is a native of Brazil, South America, where it is still found in large numbers in its wild state. It is occasionally called the Brazilian duck. In their wild state these ducks are very dark colored, while with us they are changed to various mixtures of brown, black, and white, and sometimes a blending of brown and drab. The adult drake weighs from nine to ten pounds, while the duck rarely exceeds half his weight. They have long bodies, short legs, and a very clumsy appearance upon the ground, which they much prefer to large bodies of water. They like to perch upon the branches of a low tree, a fence, or a low building, especially during the night. They do not rank high for the table, even when young; and the males are tyrants in the poultry yard. Time of incubation from 34 to 36 days.

The Rouen duck has for a long time been as distinguished in France as is the Aylesbury in England. It is the largest and, in some respects, the best duck of all our domestic varieties, though less beautiful in form than the Aylesbury. Its color is pleasing, closely resembling the wild Mallard. These ducks have broad, clumsily-built bodies, and when highly fattened they are very ungainly in their movements. They are remarkably quiet, easily fattened, and are most excellent layers of very large eggs, and have no equal for the table in the domestic family of ducks. The adult Rouen not unfrequently reaches from 12 to 15 pounds per pair.

The Wood duck, so called from its habit of building its nest in the hollows of trees, and also from its frequenting the edges of river groves in search of acorns —one of its principal foods in autumn—is one of the most beautiful of the duck tribe and easily domesticated, its small size making it unprofitable either for eggs or flesh.

The Bahama duck is very easily domesticated, and resembles a small Mallard with a pointed tail, but the bright red color on the base of its bill renders it a most beautiful object when swimming. Of these varieties the Mandarin duck is generally disseminated. They were originally imported to the United States in 1854. In its plumage it resembles the wood duck, but is more beautiful and elegant. It is chiefly valuable as an ornamental species.

Cayuga Black duck, one of the most superior, as it is among the largest of either American or foreign ducks, has been bred in the country so long that all trace of its origin is lost. Tradition says they are descended from a sort of wild ducks that stop in Cayuga lake and Seneca river, on their passage north and south, fall and spring. The Black Cayuga duck, in perfection, is black with a white collar on the neck, or white flecks on the neck and breast—rarely black without white; and as the white seems inclined to increase, we usually select them nearly or quite black for breeding. The duck has a faint green tint on the head, neck and wings. The drakes usually show more white markings than ducks, and the green tint on the head and neck is more strongly marked.

The Cayuga ducks are hardy, of good size, and for the table are superior to other ducks; the flesh quite dark and highly flavored. If well fed, they become very fat; can be readily made so fat that they cannot raise themselves from the ground by their wings; 12 to 14 pounds to the pair would be a good average weight.

They are very quiet in their habits; they are rarely able to rise from the ground—a fence one foot high will turn them; they are not disposed to wander from home; they commence laying about the last of March and lay 50 to 90 eggs, when they wish to sit, which they do well, but they are careless mothers; they cross readily with other ducks, and produce is certain.

The title Call-duck is given to two small varieties of the domestic duck, that bear the same relation to the full-sized birds that Bantams do to ordinary fowls. They are known as the Grey and the White Call; they both differ from ordinary breeds in their very small size; for show birds, the smaller the better. The shape of the head is also distinct; they are most esteemed when possessing a full, round forehead, with a broad, short bill. In color, the Grey Call should be an exact counterpart of the Rouen and wild breeds, not only in plumage, but also in legs, feet, and bill. The White Call should be clothed in feathers of pure and unsullied white; the bill, however, is not flesh-colored, as that of the Aylesbury, but a bright clear unspotted yellow, any other color being regarded as disqualifying the birds from success in a severe competition. Call-ducks, as their name implies, are remarkable for their loud and continuous quacking, in a shrill, high note, which can be heard at a great distance, and which renders them admirable as decoy ducks to allure the wild species to their destruction.

The Penguin duck is characterized by greater length of the femora, or upper bones of the legs, and of the bones of the feet, whilst the tibiæ remain unchanged. In consequence of this peculiarity of structure, the duck, in walking, is obliged to assume an erect attitude, like that of the Penguin. Beyond this quaint peculiarity, the Penguin duck has no specialty to call for particular observation, or to distinguish it from the ordinary species, of which it is evidently only an accidental variation, perpetuated by the care of man. The colors of the Penguin duck are varied, and the bird breeds freely with any of the common varieties.

The Hook-billed duck is another accidental variation which has been propagated by man. It is characterized by the bill being turned downwards, instead of being straight, as in the other varieties. In color and size, they vary considerably.

The Tufted, or Crested duck is another variation which has been perpetuated and increased by the care and selection exercised by man. It is characterized by a large tuft of feathers on the top of the skull, very like that of a Polish hen. In some cases this globular crest attains a size of three inches in diameter, and renders the birds very remarkable objects.

The Pekin duck is comparatively a rare bird in the United States, having been first imported about 1871, and at present not largely disseminated. They are larger looking than the Aylesbury, but seldom weigh heavier.

Duck, To Cook. Ragout of Duck. Put the gizzards, livers, necks, etc., into a pint of good strong beef broth, or other well seasoned stock. Season the ducks inside with salt and mixed spices. Brown them on all sides in a frying pan, and then stew them till tender in strained stock. When nearly ready thicken the sauce with browned flour and butter.

Roast Duck. Prepare your duck for roasting and use the following dressing: Chop fine and throw into cold water three good-sized onions, one large spoonful of sage, two of bread crumbs, a piece of butter the size of a walnut, a little salt and pepper, and the onions drained. Mix well together, and stuff the duck. An hour is enough for an ordinary-sized duck. The gravy is made by straining the dripping; skim off the fat, then stir in a large spoonful of browned flour, a teaspoonful of mixed mustard, a wineglassful of claret. Simmer for ten minutes.

To Hash Duck. Nothing tastes better than a fat roast duck. Cut it into pieces as in carving at table, skin and soak these by the side of the fire in a little boiling gravy till thoroughly hot. Add a small glass of wine and a sufficient quantity of mixed spices to give the sauce a high relish.

Due-Bill, a brief written acknowledgment of a debt, not made payable to order, and not transferable by indorsement, like a promissory note. They are as binding as notes, and collectible by law.

Dumb Waiter, a movable frame by which dishes, etc., are passed from one room or story of a house to another.

Dumpling, a kind of pudding or mass of paste, in cookery; often a cover of paste inclosing an apple and boiled,—called also "apple dumpling." The latter may be prepared and cooked as follows: Take one pound of suet, one pound of flour, heaping teaspoonful of salt; chop the suet in a little of the flour to prevent its caking, chop very fine, then add flour and mix thoroughly; add cold water enough to make a paste; roll as thin as pie-crust; pare a dozen large apples, quarter and core them, keeping each apple by itself; place the quarters together again and cut the paste in a square to cover the apple; tie each dumpling in a square cloth, leaving a very little room to swell. Boil an hour, putting them into boiling water. Serve with hard sauce. Some cooks prefer to put the dumplings into cold water and boil until done, when they will be light. Another method is to put pared and quartered apples in a tin pan, with considerable water to cook them. Cover tight with soda-biscuit crust; leave no vent; cover close with another pan inverted over it; put on top of the stove and cook half an hour, or until the crust and apples are done.

Dun, a color partaking of brown and black. Large dun horses are generally well-tempered, good feeding animals, neither swift-footed nor very strong, but well adapted to the labors of the farm; but small duns, when somewhat lightly bred, suit excellently for the curricle or the phaeton, and when they have a dappling of a darker color upon their prevailing dun, they are thought to be decidedly beautiful.

Duress, an actual or threatened violence or restraint of a man's person, property or character, contrary to law, to compel him to enter into a contract or surrender property. The violence must be such as would naturally operate upon a person of ordinary firmness and inspire a just fear of great injury to the person's reputation or fortune. A contract obtained by such duress is void.

Dutch Cheese, a small, round, hard cheese, made from skim milk,—called also "cottage cheese." To make it, heat sour milk until the whey rises to the top; pour off the whey, put the curd in a bag and let it drip six hours, without squeezing it; chop it fine in a wooden bowl, salt to taste, and work to the consistency of soft putty, adding a little cream and butter as you proceed; then mold, with your hands, into round "pats" or balls, and keep in a cool place. It is best when fresh.

Dwelling: see Residence.

Dyeing. Formerly this process was very tedious and troublesome, requiring special attention and appliances, together with a degree of chemical knowledge not common. But with the dyes and drugs that may now be obtained at any drug store, a ribbon, a feather, a soiled or faded dress may be quickly, easily and cheaply dyed.

General Directions. See that everything is clean. Scour the goods in soap, then rinse thoroughly; sometimes they are steeped over night in soap dye. Before putting goods into the coloring matter, dip them into water, to guard against spotting. In coloring, soft water only is used, and sufficient to cover the goods. In the recipes that follow, this is always understood where the quantity of water to be used is not mentioned. When the fabrics are dyed they should be first aired, then rinsed well, then hung up to dry.

Never wring silk or fine materials of any kind, either in scouring or dyeing. If a light color is to be given cotton goods, they should be bleached before coloring.

TO DYE COTTON GOODS. BLACK. For each 5 pounds of goods boil half an hour in a decoction of 3 pounds of sumac, and steep in the same 12 hours; then dip in lime-water for half an hour; remove and let them drip 1 hour; then run through the lime-water again for 15 minutes. Now make a new dye of 2½ pounds of logwood, boiled 1 hour, and dip again for 3 hours; then add 2 ounces bichromate of potash to the logwood dye, and dip another hour. Wash in clean, cold water; dry in the shade, and you have a permanent black,—one that will stand anything.

For coloring black that will not crock: Extract logwood, 3 ounces; copperas, 1 ounce. Dissolve copperas in an iron kettle; dip goods in copperas water; after wetting thoroughly wring out, air a few minutes, then dip in logwood dye, bring to a boil, keep in dye about 1 hour, occasionally airing; color in iron kettle, wash and rinse; when dry, is ready for use. The secret consists in keeping the dye apart.

RED. Take muriate of tin two-thirds of a cupful, add sufficient water to cover the goods, and raise to a boiling heat; boil an hour, stirring often; then remove the goods, empty the kettle, fill with clear water, and add 1 pound of nicwood. Steep half an hour at blood-heat, then put in the goods and increase the heat to almost boiling for one hour. Now air the goods and dip for an hour, then wash without using soap.

SKY BLUE. For each 3 pounds of goods take 4 ounces of blue vitriol, and water to cover; boil a few minutes, then dip for 3 hours, and pass the goods through strong lime-water.

OTHER SHADES OF BLUE. For 5 pounds of cotton cloth dissolve 5 ounces of copperas, drain off, boil in the copperas water 1 hour; then dissolve 5 ounces of prussic potash in clear water; put in your goods, and scald well, frequently turning them; then lift from the dye, drain them, and air them one-half hour; then add 2 ounces of oil of vitriol; dip again, rinse well in clear water, and dry them. Be sure to have your goods thoroughly wet before dyeing them any color, or they will be spotted. Two shades of any color may be obtained by leaving some rags in the dye longer than others. Woolen goods always take the dye most readily.

BROWN. A beautiful brown may be obtained by putting the goods through a solution of prussiate of potash after having colored them blue by the last recipe.

Or, for 5 pounds of goods dissolve 1⅛ pounds of catechu in sufficient water to dip the goods; in another vessel dissolve 4 ounces of bichromate of potash in a like amount of water. Have both liquids hot; dip the goods first in the catechu liquid, then in the solution of potash alternately, until the color is of the right shade; wash in cold water. Bichromate of potash is the proper mordant for catechu.

YELLOW. Use 7 ounces sugar of lead for 5 pounds of goods; dip for two hours, then make a new dye with 4 ounces bichromate of potash and dip until the color suits. Wring out and dry, repeating if not yellow enough.

ORANGE. For 5 pounds of goods use 4 ounces sugar of lead for the first dye; boil a few minutes and after cooling a little, put in the goods. Dip for two hours and wring. Make a new dye with 2 ounces madder and 8 ounces bichromate of potash, and dip until color suits. If the color is too red dip a sample into lime-water and take your choice.

Or, prepare a lime-water, as for whitewash, the stronger the deeper the color. Let the lime settle; drain off the clear water and boil; while boiling put in the goods which have been colored yellow; rinse well in cold water.

GREEN. Dip the goods in home-made blue dye until blue, then dry and rinse a little. Take fustic, 3 pounds, and 3 ounces logwood to each pound of goods, and make a dye by boiling one hour. When sufficiently cool to bear the hand, put in the goods, move briskly about for a few minutes, and then let them lie an hour, after which remove and thoroughly drain. Then dissolve and add to the dye half an ounce of blue vitriol for each pound of goods, and dip another hour, then wring and dry in the shade. Any shade of color may be obtained by adding or diminishing the logwood and fustic.

TO DYE WOOLEN GOODS. BLACK. Use 6 ounces of blue vitriol for each 5 pounds of goods. After boiling a few minutes, dip the goods for ¾ hour, airing often; then remove and make a new dye by boiling 3 pounds logwood for half an hour. Now dip the goods ¾ hour and air, and then for ¾ hour more, and wash in strong suds. It is said exposure to the sun will not fade this color.

BLUE. For each 2 pounds of goods make a dye of alum, 5 ounces, cream tartar 3 ounces, in which boil the goods one hour, then put them into warm water containing more or less extract of indigo, according to color desired; boil until the shade suits, adding more blue if necessary.

SCARLET. For each 2 pounds of goods make a dye of 1 ounce cream tartar; pulverized cochineal, 1 ounce; muriate of tin, 5 ounces. Put in the goods while dye is boiling hot, stir briskly for 15 minutes, then boil 1½ hours, stirring slowly. Wash in clear water; dry in shade. Said to be very fine.

PINK. For each 3 pounds of goods take 3 ounces of alum; boil and dip an hour, then add to the dye 4 ounces cream tartar, pulverized cochineal 1 ounce. Boil well and dip goods while boiling until the desired shade is obtained.

MADDER RED. For each pound of goods, use alum, 5 ounces; cream tartar, 1 ounce. Put in the goods and bring to a boil for ½ hour, then rinse and boil ½ hour longer; empty, and fill the kettle with clean water, into which put one 1 peck of bran; raise to milk heat; let it stand until the bran rises, then skim it off, and put in madder ½ pound. Put in goods, and heat slowly to a boil. Use strong soap-suds in washing.

DARK SNUFF BROWN. For each 5 pounds of goods use 1 pound of camwood, boiling 15 minutes, and then dipping ¾ hour. Remove goods and put 2½ pounds of fustic into the dye; boil 15 minutes; dip goods again for ¾ hour, then add blue vitriol, 1 ounce, copperas, 4 ounces, and dip for ½ hour. More copperas will darken the shade.

PURPLE. For each 3 pounds of goods use 6 ounces cudbear. Rinse the goods well in soap-suds, then dissolve the cudbear in hot suds (not quite boiling) and soak goods until the desired shade is obtained. Brighten by rinsing in alum water.

CRIMSON. Work for 1 hour in a bath made of 1 pound of cochineal, 1 pound cream tartar, 1 pint protochloride of tin. Wash out and dry.

To dye yarn for STRIPED stockings, when your dye is ready, dip only ½ the skein into it, leaving the other white. If you wish to dye in two colors, the first color must be dried before attempting to dye the other half.

TO DYE SILKS. BLACK. Use the formula for dyeing woolen goods black, except that it should be weaker. Work the goods in the bichromate of potash, a little below boiling heat; then dip in the logwood. If colored in the blue vitriol dye use about the same heat.

PURPLE. Dye a light blue first by dipping in the home-made dye, then dry. Now, for each pound of goods take 4 ounces of alum, water to cover, and dip in the goods while the alum is warm.

CRIMSON. For each 2 pounds of goods use 6 ounces of alum; dip at hand-heat for one hour, then take out and drain while you make a new dye of cochineal, 6 ounces; bruised nut-galls, 4 ounces; cream of tartar, ½ ounce, in 6 gallons of water; boil the mixture ten minutes, and when a little cool, begin to dip, gently raising to the boiling point; dip for one hour, and then wash dry.

SKY BLUE. (Either silk or cotton.) Take 2 ounces of blue vitriol and dissolve in 1 gallon of water. Dip the goods in this for 15 minutes and then run through lime water. Said to be beautiful and durable.

BROWN. (For silk or cotton.) After dyeing sky blue by last recipe, run the goods through a solution of 1 ounce of prussiate of potash dissolved in 1 gallon of water. Simple and cheap.

GREEN. Take ½ pound of yellow-oak bark for each pound of goods; boil ½ hour, and then turn off the liquor and dissolve it in 6 ounces of alum; let it stand until cold. While making this give the goods a light blue in the dye-tub.; then dry and wash them, after which dip in the alum and bark dye. If the goods do not take color well, warm the dye a little.

OLD-GOLD. To dye silk or satin a beautiful old-gold color, take green horse-radish leaves, steep them in water, make a strong dye; after dipping the silk or satin into the dye thoroughly, wash in soft-soap suds; iron while damp, laying a cloth over the silk. This should always be done when ironing silk or ribbon, even if it has not been washed, but simply sponged.

To color LINEN, make a strong solution of black tea, and mix it with the starch after washing the goods. Then dip the goods in this starch and dry quickly. Boiling linen in a decoction of common green grass or good hay will make it look new.

To color OLD DRESSES, either cotton or worsted, any shade of drab or slate color. To color 14 yards get 1 pound cheapest black tea, probably any kind of cheap tea will do; boil thoroughly with old rusty nails, or any kind of rusty iron in the tea; get the shade you want by the amount of water used. It makes a very pretty color to color over light dresses.

To color a FADED SHAWL, take 5 cents' worth (more will do no harm) of extract of logwood, and copperas the size of a nutmeg; put into an iron boiler or kettle, with water sufficient to well cover the goods. Scald and stir well from the bottom until dissolved; then put in the goods and scald half an hour; take out and drain, after which scald in skimmed sweet milk. You need not have your hands stained in the processs if you avoid handling the goods before scalding in the milk. Wash thoroughly after scalding. If the shawl is all wool, it will hide the stripes, but cotton will not take a perfect black.

To color KID GLOVES BLACK, take 4 ounces of alcohol and a handful of logwood chips; dissolve the chips in the alcohol, put the gloves on your hands, and put the liquid on with a sponge.

To color GRASS, take 1 pound of alum to 5 quarts of water, dissolved on the stove in a tin pan; when a little cool, put the grasses in, and let stand until formed. Gum-arabic water is the best to stick flour or dry paints on grasses. Get 5 cents' worth of chrome yellow, chrome green, ultramarine blue, Vandyke brown, and carmine,—all dry paints. The mucilage should be shook off the grass, so that little remain. Then whip them in the dry paint, tipping brown with blue, etc. Enough of the dry paint sticks on to color them beautifully. These mixed with the crystallized grasses make pretty winter bouquets.

ANALINE DYES. These are put up in packages which may be obtained at drug stores. They embrace almost every conceivable tint, and are not expensive. Full directions accompany each package. They save much trouble, and as a general thing are not apt to disappoint.

Dye-Stains, HOW TO REMOVE FROM THE HANDS: Wash them in cold water that is made about as sour as lemon-juice with sulphuric acid (oil of vitriol); wash them thoroughly in pure water immediately afterward.

Dynamometer (di-na-mom'e-ter), an instrument for measuring the force or power of a machine or plow, the amount of draft, etc.

Dysentery, inflammation of the mucous membrane of the large intestine, attended with bloody evacuations and pains. It is very liable to be mistaken by ignorant observers for the far milder disease of diarrhœa. It begins with a griping pain, and a desire to void the alimentary contents. In general, little is voided at a time. The matter discharged is composed chiefly of mucus mixed with blood. A dose of castor oil with 2 teaspoonfuls of paregoric, mixed, taken once a day, will relieve dysentery. No solid food should be eaten, and the drink ought to be flaxseed tea, or some other demulcent. Laudanum is also efficacious to check the discharge. Take 20 or 30 drops for an adult. Or, mix 1 drachm each of powdered rhubarb, saleratus, and pulverized peppermint, and ½ pint each of the decoction of anise seed and hot water; strain, sweeten, and add 3 tablespoonfuls of brandy, and take a tablespoonful every hour. *Hygienic*: Same as for diarrhœa. As soon as one suspects he may have dysentery, he should call his favorite physician.

Dyspepsia. A person is, in common language, said to be dyspeptic when the appetite is impaired or lost; when there is a load and weight at the stomach after taking food, with eructations of gas, and sometimes of an acid fluid into the mouth; accompanying these symptoms is nausea, an occasional sickness, with a tense headache at the back of the head, or localized over the eyes; very often, also, there are dark specks before the eyes, and the eyes themselves look heavy, yellow, with a dark circle beneath. The tongue is red; the papillæ small, but elongated, and the organ itself enlarged, indented by the teeth, or pale and enlarged in the same way, or covered with a white or yellow fur; the bowels are costive, the water high colored, and with a red, or more rarely, a whitish sediment. Such are a few of the more prominent symptoms of the different kinds.

The principal causes of dyspepsia, and the whole train of distressing complaints resulting therefrom, are produced from the present fashionable habits of luxury and intemperance, both in eating and drinking, such as spirituous liquors, high-seasoned meats, excessive use of tea and coffee, hot bread, spices, pastry, tobacco in every form, irregular evacuations, excessive venery, swallowing the food without chewing it sufficiently, overloading the stomach, derangements of the liver and spleen, want of exercise, and pure air, the depressing passions, or great anxiety of the mind, and whatever has a tendency to debilitate the lining of the stomach, so as to prevent it from the healthy performance of its functions.

People in cities, whose minds are distracted with the pressure of business, and who are forced to great irregularity in sleep and eating, are peculiarly liable to dyspepsia. Farmers and their wives and children, who live in the country, who labor daily, never hurry, sleep sound at night, and eat wholesome articles of food, and who drink cold water, or very weak tea and coffee, are seldom affected with it. In the country, milk is the drink of children, instead of tea and coffee, which, no doubt, contributes greatly to strengthen and fortify the stomach against disease. In the beginning of dyspepsia strengthening medicines should not be given. First, remove the load or oppression, then improve and strengthen the digestive organs. This may be done by a gentle dose of ipecacuanha, from 5 to 10 or even 20 grains, and when the operation is over and the stomach has become quiet, give a gentle purgative, as Seidlitz powder. For children, a drachm of rhubarb, and the same quantity of calcined magnesia, divided into four equal parts, one stirred up in syrup and given night and morning, will relieve the digestive organs from sourness and wind colics, with which young persons are so much tormented. We recommend all dyspeptics to apply for competent aid, if they find their complaints to resist their own treatment for two or three weeks. A proper diet is one of the best remedies.

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EAR, an animal's organ of hearing. Its internal structure is somewhat similar in man and in the numerous species of the higher order of quadrupeds; and it possesses, in all, a very complex and yet simple organization, exquisitely adapted to its functional uses, beautifully combining utility with protection, and admirably illustrating the wisdom and beneficence of the Creator. Its external structure, in the several animals, varies in adaptation to their respective habits and constitution, and affords, both in its general form and in its wide variations, high and striking evidences of minute and most benevolent designs. Though any description of either the internal or the external structure would be out of our province, yet one great differential feature may be noticed, that the outward ear of timid and graminivorous animals usually lies backward, to enable them to detect sounds of danger or pursuit, while that of the predacious and carnivorous animals usually lies forward to enable them to catch every intelligence of prey.

The outward ear of the horse is a truncated, obliquely severed and very elegant cone, so admirably constructed as to receive a vast volume of vibration in the air, and so exquisitely mounted on organic mechanism as to wheel and circle and oscillate with the utmost power and freedom of motion. The ears of a horse, especially of a spirited one, are in continual play, and are so often and easily stretched in directions opposite to each other as to serve the purpose of a double organ, and possesses such power and play of nerve as to afford expressive indications of temper and intention. "The ears," remarks Mr. Blaine, "we usually suppose criterions of the spirit of the animal," and we have seldom seen a horse that carried one ear forward and the other backward during his exercise, especially if on a journey, but what was lasting and good. The reason appears a plain one; a horse of spirit, strong, and not easily fatigued, is attentive to everything around him, and directs one ear forward and one backward to collect sounds from every quarter. We need not mention that the ears are an indication of the temper of the animal, and that he is seldom either playful or vicious but the ears are laid flat on the neck. It was kind in Providence to give us such a warning in an animal who does not want craft to surprise us, nor strength to render his resentment terrible. The twitching of a horse's ear in the way of discipline or punishment may occasionally be necessary in a case of obstinacy, and in order to prevent a severe application of the whip to other parts of the body; but generally it is both unnecessary and cruel, and sometimes it inflicts very painful wounds and contusions. When a wound in the ear is merely a laceration of the cartilage, it readily heals; but when it is an ulceration of the integument and the cellular substance, it will probably be healed by no gentler means than powerful caustics or the application of the cautery.

The ears of cattle have a very different form and size in some breeds than in others; and they constitute one of the minute or secondary points by which the character and the comparative value of breeds are judged. They are usually of well proportioned size and freely movable in the polled breeds, and are comparatively small, inconspicuous and stiff in most of the horned breeds.

The ears of some breeds of swine are peculiarly and amazingly subject, in the back part of their great lops, to troublesome cracks and sores. A good cure in these cases, as in that of scurf in the ears of cattle, is calamine and rosin ointment. If there is any disposition to mange in swine, it is most evident about the ears, and the mischief is sadly aggravated when brutes in human shape set their dogs on them, the favorite hold of which is the ear.

Ear-wax assists the hearing and is so bitter and offensive to all insects, that the fear of ear-wigs, etc., entering the ears is to a great extent unnecessary. Instances of insects entering the ear, are, however, not altogether unknown, although it is difficult to account for their doing so.

Ear-wigs in the Ear. If one of these insects should crawl within the ear, and a piece of apple is applied to the ear the insect will crawl upon it, it being fond of apples; or some drops of sweet oil, oil of almonds, or olive oil may be dropped into the ear, which will instantly kill this or any kind of insect. Insects are deterred from attempting to penetrate the ear by the offensive bitterness of the wax it contains, but they sometimes get in, and are unable, although desperately anxious, to get out.

Ear, a spike or head of corn, oats, barley, wheat or other cereal grass. Ears of grain, though an almost universal popular phrase, is a somewhat indefinite one, and cannot be used in botanical or minute description.

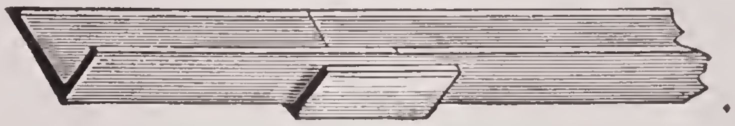
Earache. This troublesome complaint is sometimes occasioned by some foreign substance getting into the ear, or by exposure to cold, or by the forming of an abscess. Dip a piece of wool into a little sweet oil, and place it into the ear. The progress of this painful complaint may often be checked by means of a large poultice of bread and milk, with a little fine oil added. This should be applied as warm as possible and renewed every three or four hours. At the same time an aperient medicine should be taken. A little warm oil of laudanum dropped into the ear sometimes gives relief, and may be used before the application of a poultice. When suppuration appears, a little warm milk and water should be used for its removal, with a syringe, several times a day, care being taken not to use too much force. The following remedies are recommended: Boil a fig for five minutes, wrap it in a piece of rag and put it into the ear, binding it on with a handkerchief round the head. When the earache is very severe and of long continuance, put a small blister behind the ear in addition to one of the above remedies, or a leech may be applied to the same part; or put 4 drops of best kerosene oil and the same quantity of laudanum into a teaspoon; put in a little bit of cotton batting, about enough to absorb the mixture; hold the spoon and contents over a lighted candle until it begins to hiss with the heat; turn the cotton over, apply spoon and contents once more to the heat, then pinch out the cotton; put it hot in the ear; tie a bandage over the ear to keep the heat in, and relief is immediate. If you are subject to earache, keep a small bottle with each or the articles named, and you can get relief at all hours of night or day in a few minutes.

Place in the ear cotton wool moistened with sweet oil and laudanum. A flannel bag of salt, or chamomile flowers, made very hot and applied to the ear at bed-time, will often give relief. Or, a roasted onion, and hartshorn and oil, are household remedies. If it arises from heat, frequently apply wet cloths. If from cold, boil rue, or rosemary, and steam the ear through a funnel. Or, rub the ear hard for a quarter of an hour. Tried. Or, be electrified. Or, soak the feet in warm water; roast an onion and put the heart of it into the ear as warm as can be borne; heat a brick, wrap it up, and apply to the side of the head. When the feet are taken from the water, bind roasted onions on them. Lard or sweet oil, dropped into the ear, as warm as it can be borne, is good. Or, drop in juice of onions. Or, take equal parts of the best strained honey, balsam copaiva, and brandy; put in a bottle, and, when wanted, warm and shake it thoroughly, and put two drops in the ear three times a day, until relieved. It will cure deafness when caused by cold. A little piece of raw cotton will keep the oil in the ear.

Hardened wax in the ear may be softened with oil and then syringed out. Insects and other foreign bodies may be carefully swabbed out or syringed out. Do not introduce sticks, tweezers or other hard substances into the ear for taking out these things, as there is great danger of injuring some delicate organ permanently.

Ear-Mark, a notching, clipping, slitting, or other artificial mark, made on the ears of cattle, sheep, dogs or other tame animals, with the design of distinguishing them from other individuals or flocks of their own species. In counties where stock is permitted to run at large these marks are recorded generally in the county clerk's office and then they become legal means of identifying stock.

Earnest, any portion of price or wages, paid or given as ratification of contract. The smallest portion, even a penny, is sufficient; but in order to make it binding on either party to the terms of the agreement, it must be expressly stated to be earnest.



Eave-Trough.

Eave-Trough. This economical attachment to every building is made either of wood or tin, the former being generally preferable. The styles of each are somewhat various, the greatest difference being in the degree of substantialness with which they are constructed. Probably the best kind is the literal trough, consisting of single pieces of guttered wood, joined at the ends only, if joined at all; but the cheapest and quickest made is that which consists simply of two boards nailed together, as illustrated in the annexed cut, with the seems filled with putty, pitch or other like substance. The joints should be embraced by a bracket, as seen in the engraving. See Residence.

Eccentric (ek-sen'tric), out of center. An eccentric wheel or disc performs the office of a crank.

Eclectic, selecting; taking points from many or all systems; as, the "eclectic" system of medicine; an "eclectic" philosopher, etc.

Economy, management of domestic affairs; system of rules by which anything is managed; wise management; prevention of waste. We have "domestic," "political," "social," etc., economy. See Domestic Economy. Political economy is the science of wealth,—the accumulation and distribution of wealth; and in national affairs questions of currency, tariff, finance, etc., are involved in political economy. Changing the volume of currency is generally considered bad policy, as the mysterious fluctuations of prices which it occasions gives unprincipled speculators the advantage of the laboring classes. In comparing prices, one should consider both what he buys and what he sells. For example, labor at $1 a day when wheat is $1 a bushel is the same to a man as when labor is $2 a day and wheat $2 a bushel.

Education, that discipline and knowledge which one obtains by systematic study. In the broadest sense, everything that we see, hear, touch, taste, smell and think of has a tendency to "educate" us in some direction or another; in the more restricted sense, "education" signifies that knowledge and mental discipline which we obtain at school. By "mental discipline" is meant such a culture of the mental powers and systematizing of the data of knowledge or facts, as enable one to make use of his knowledge when he needs it. There is the same difference between knowledge and discipline as between tools and the having of them at hand in good trim, with ability to use them properly.

There is no topic of more vital importance to the farmers of America than that of education, and none should receive from them more zealous attention. We will divide this article into two departments; in the one we will speak of the common schools, and the education obtained therefrom, the other we will confine to agricultural education.

While we have a very elaborate and excellent system of education, yet it is evident that the schools of the rural districts are not doing the good they should and might do, as they do not sufficiently allow for the peculiar talents of each pupil, and their courses of study are too far behind the demands of this utilitarian age. We wish to show why and how it is that almost the entire force of our common schools tend to throw our young men away from the shop and the farm, and to drive them into the scholastic professions; or pile them up in huge stacks of agents, clerks, and office-seekers. A committee of the Massachusetts Legislature, where the whole system originated, and where it has been carried to greater perfection than perhaps in any other State, report that " the results of their system of schools is not satisfactory;" and that " the public school system of New England fails to meet the demands of modern civilization."

The great uprising of the industrial classes, and their new attempts at founding schools all over the republic, whatever may be said or thought of their work, shows the same fact. Along side of the efforts to confine children, through all their young and growing years, to school-rooms, and the abstract studies in books, the nervous system has become either excessively developed or diseased; insanity has greatly increased; a whole crop of brain and nervous diseases are said to have sprung up, some of which are not developed till late in life; females in particular become inert, weak, and nervously diseased, indisposed and incapacitated for the real duties of the wife and the mother, insomuch that the most highly educated races are perpetually running out, and giving place to races of less so-called culture, but of greater stalwart vigor; all of which tends to show that we may be making them over into angels a little too fast for the good of earth and time; or, if not, it betokens widespread distrust and doubt, not of our present system as such, but of our present mode of running it. The general complaint that children are kept in school so continuously that they become dull and listless, and although immense sums of money are expended upon the schools, that they do not after all leave them as well fitted for the real duties of life as they used to do in half the time, and at less than half the expense, shows the same general fact of uneasiness under our present administration.

However great these evils may be, or may not be, one great vital and all-important end of the school system is, after all, being perpetually realized and attained, whatever else may fail; the children of our nation are learning those habits of self-government and self-restraint in public, in crowds, and acquiring a sort of homogeneity in manners, tastes and feelings, which could never be learned at home; and which perhaps tends to conserve and perpetuate the freedom of the republic more than all else combined.

But we wish to more particularly point out some of the evils that have grown up under our system, that affect the farmers and the industrial classes in the rural districts.

The first is the curse of " thoroughness " so-called, which is really not genuine, but a sham thoroughness. In a philosophical point of view, a child cannot go thoroughly into any subject whatever, and it is utterly absurd to attempt to make him do it. It would not be more absurd to attempt to glue tassels and ripe ears upon a corn-stalk as soon as it is out of the ground, in order to make a sort of dumb show of an early harvest, and seem to outstrip the old-fogy pace of your neighbors. A child's thoroughness, in any such sense, is all a mere sham. More than that, it is a curse that may and will weight him down in all after life. Nature requires, everywhere, that things should slowly grow into all organisms, physical, mental and moral; they can neither be pounded into them, nor glued or tied on to them. It is as absurd to attempt to teach a child what a man ought to know, as it would be to attempt to make him lift or eat what a man does. He cannot safely even begin those forms and modes of knowledge that are peculiar to riper years; or if he does he begins at the peril of his physical or intellectual well-being, or both. He may, indeed, seem to be a prodigy when he is young, but he will be dead, or a fool, before he grows old. Long continued, wearisome and exhaustive attention to any subject whatever, is unsuitable for a child, under pretense of giving him something to do. Something to do!! Who ever saw a young child idle? Something to do!! Why, has he not got all the flies of the house, and all the butterflies of the field to catch and examine; his top, and whip, and skates, to mend and to spin, and ten thousand other things to do, that no mortal else ever thought of? Has he not got to stand on his head, knock his hat-crown in, and wear holes in his shoe-toes, knees and elbows? Look into a boy's drawer, where he keeps his own peculiar "school apparatus," and you will find out that he has got enough planned out to do for a life-time. Has he not got to eat tons of green apples and other coarse vegetable and animal products, and before he is a dozen years old, to transform all this rough garbage into at least one hundred pounds of good, solid, human bones, muscles and nerves, so firmly, and yet so delicately elaborated, that they are fit for an angel's use? All these things which he now contrives to do for himself, help him forward in this first, greatest, and most important part of all his life-work on earth. When will it get through our stupid, scholastic heads, that the first duty of every born man and woman on earth, both to God and man, is to eat, to drink, to rollic, and to grow? And if they are simply shielded from harm, and kept out of unendurable mischief, and allowed to do it, much in their own way, it is the best thing we can do for them, or with them, for well nigh the first ten years of their life. Some little general shaping of their course, some power of reading, some "kindergarten" care, either in school or out, and better out all the time than in, more with reference to varying their tastes and employments, and improving their moral feelings, than in hope of making them savans in anything, is about all we can safely do for them.

In a world where no man thoroughly knows how a candle burns or a blade of grass grows, or his own eyes see, what consummate folly to attempt to make a mere child thorough in anything. Nature and Nature's God give a child a sort of bird's-eye view of a vast variety of things in their most natural and simple relations without protracted or profound views of anything.

It is evident that those who would be anything, or become anything, must elect some very small part, to start with; and one of the chief uses of our schools (after confirming them all in the great *moral* American *habit of self-government*) is to enable them, by giving them tastes and snatches of as wide a range of subjects as possible, connected with the real arts and interests of common and social life, more intelligently to make this proper selection for themselves.

We should not assume that they are to become teachers, or experts in any one thing whatever, that can be got out of books; for not one in a thousand of them ever will, or ever ought to, do so.

Take for example our four fundamental branches: reading, spelling, writing and arithmetic. These are the keys that unlock the gateways of knowledge to all other branches, and open the doors to all other forms of human intercourse, human thought, and human knowledge. Of course, some knowledge of these is an indispensable necessity, as a first step, to every child alike. But how much? that is the question. To become an expert at any single one of these most simple and elementary of all the forms of learning, a man must devote his whole life to the task; and then probably not one in a hundred would really succeed. Amid all our schools and schoolings, a real expert at reading, writing, or arithmetic, is about the rarest of all men found. The fact is, that even in these most common and indispensable of all branches of human learning, there is no more sense in keeping our children drumming and thumbing over them in the schools, year after year, as though we expected to make them experts in one, or all of them, than there would be in trying to fit them out with a pair of wax wings, to fly to the moon with. A child should be taught to read, write and cipher, well enough for a child—not for a man; an expert; a writing master; a stage player; an United States senator; and there the whole subject should be dropped, giving him pen, ink, and paper, and interesting books to read; and in his regular school drill he should pass on to something else, of more interest and importance for him.

Who ever thinks of reading, writing, or ciphering, as our teachers tried to drill us to do when we were boys? To be sure, we use the same alphabet, and that is about all of it. With good books, eloquent speakers, interest tables, and lightning calculators lying all about us, we soon make out methods of our own, for our own peculiar use, shorter and better than any school-drill in childhood can possibly give us, and have no need to fill our heads, to start with, so full of dry, abstract, memorized rules, that there is no room for brains in them.

In all this we are fully aware of the popular monomania for spelling, or of the pedant's unpardonable sin of not knowing how to spell; and of the common impression, that if a child is not drilled for years in the spelling book he never will learn to spell. Well, suppose it is so; it may be better still not to know how to spell or write all the totally absurd words in the English language, than it is to know nothing else. The man who can make a plow, or invent a plow, or hold a plow, is a vastly greater man, all other things being equal, than one who can only spell it, however many silent letters he may hitch on to it.

Reading naturally divides itself into two branches: reading for personal information, or silent reading, and loud reading for the benefit or amusement of others, or elocution. The first is of vastly the most consequence to all children in our common schools. The sole thing for the child here is, that he should learn to associate every printed word with its common conversational, natural pronunciation or sound, and its exact idea. A better way to teach him exactly how not to do it could not be devised than to set him to declaiming, in an unnatural orotund voice, high flights of oratory, or poetry, of which he cannot possibly have an adequate and proper conception, no more than he can of the man in the moon. One of the greatest curses that can befall any man, and especially any child, is to form the habit of using words which he feels he does not know the meaning of.

In writing, a child ought, first, to learn to write his name in the simplest and clearest form of letters possible, with no flourish of great, sprawling capitals or shadings about it. He should approach this one most useful thing to be achieved, equally necessary to all alike, by the simplest and best analysis of all the parts of the letters of the alphabet, but with no flourish of trumpets or pens whatever, under pretence of giving him a free hand, or making him an expert at mere writing. When he can write a passable letter to his young friends, he should be let alone, and left to practice by himself, and to feel that something is really accomplished, actually done with for the present, and that he is not to be put on a life tramp over a never-ending sea of flourishes.

Children are drilled and trained and schooled in geography till they are well nigh schooled out of the world, instead of being made acquainted with what is in it. They start with a wheelbarrow full of books, in endless series and progressions; of all imaginable shapes, forms, sizes and editions; with the last improved edition in their satchel as a specimen. A school boy of eight or ten years really needs a dray-cart to get his books to school with, and back again; and he is drilled in this matter af geography as though it was expected that his future life-work was to be world-making, and that he was in great danger of getting some island of two acres in the South Seas or some village in Kamtschatka misplaced, or of making some river in Africa to run up hill. But most probably the poor child will never make a world in all his life; though he may get his head so full of mere memorized names and localities that there is room for nothing else in it.

Then comes grammar, with another host of memorized rules, which every sensible man takes special pains to forget as soon as he possibly can, in order to make room, in his head, for matters of more importance.

The boy who has learned not to swear when he pounds his fingers with a hammer, and the girl who has not learned to exclaim, "Oh, dear!" or "Awful," when she breaks a teacup or bespatters her dress, has already learned the most important rules in the use of the English language. For the remainder, if in some very brief book, or on the blackboard, those errors or vulgarisms most common in each location were simply pointed out to the pupil for practical correction, whenever he speaks or writes, without any wearisome memorizing of abstract rules whatever, it would do more and better for him, as a child, than all that Lindley Murray and his whole succession of grammatical saints have written from his day to ours. When a boy has decided to become an expert, or a teacher of language or of literature, then he should commence the metaphysical study of grammar, and not before. We all learn language and use language only by habit and by imitation; and never by rule. No man, from Adam's day to ours, ever yet learned a spoken language by rule, or ever will so learn it; and those few, who even think of any of their rules while speaking or writing, always advertise you of the fact. Their thoughtful, stiff, precise, "school-marm" mode of utterance always seems to say to you: "I am a pedant or a pedagogue. I have been clean through the grammars. I know a thing or two that you don't."

Then there is airthmetic. Suppose you should take a boy and tie upon his back all imaginable sorts of tin cups, and gill-cups, and quart and gallon cups; tight lace him with all sorts of tape-lines, strings, sticks, chains, and measures; fill his pockets with all sorts of old coin and spring steelyards; put all sorts of peck measures, baskets, and bushels over his head, already filled brimfull with all imaginable sorts of fractions and rules of fractions, and send him thus equipped out into life because he may happen to want to weigh or measure something, you don't know exactly what, in after years, and you wish to have his apparatus always with him, right at hand. He needs his measures ever at hand, as much as he does his memorized rules and tables. He can do nothing without the one any more than the other: why not have both always at hand in all after life? If a man is going to sea, or into the army or navy, where sudden emergencies may arrest him, with no possibility of consulting anew either tables or books of any sort, he should, of course, have the most essential parts of his library reprinted on his brain; for there alone it becomes practically available. And so, too, he must keep all his other apparatus on board, or along with him. But how, if in five minutes at any time, he can go into his pantry or library, and find whatever of these things he may need to use for the next six months, need he try to pack them round with him all his lifetime? As a plain matter of fact, not one in a thousand ever did do it or ever will do it. Men of action and enterprise will not burden or bother their heads with retaining such scholastic trifles. They will soon throw them all overboard, to make room for something vastly better and more important.

Of course, all of these studies are both elemental and fundamental, the indispensable tools of all other forms of knowledge. But how much time shall we spend on these mere elemental tools, before we begin to look out toward their application to real life as it is and must be? Shall we pause over these mere elements of tools for the whole common-school period of life, before we begin to cast an eye out to the big world as it actually is, and as God himself made it, solely for our education? or, shall we go through the thirty-nine years' course of Harvard, in still studying these mere tools and elements of all human knowledge? Where shall we stop? and why? That is the prime question, especially for all our workingmen on farms and in shops. If we wanted to make a practical mechanic, would we require that he should first acquire a thorough knowledge of the theoretical use of all the implements and tools and machines of the globe, or even of any one of them, before he attempted to strike a blow, under the pretext of disciplining him for his trade, or of giving him a broad culture? Who, that really knows anything about it, does not know that such sort of discipline, is dicipline to the death, for all the great ends of practical industrial life, however good it may be for mere teachers and experts; and that such broad culture, even in their case, often becomes at last as broad as vacuity itself? It is true they get, as they say, a "rounded development,"—as round as a stove-pipe, and just as hollow. The whole scheme is pedantic, scholastic, artificial, and unnatural. God made the actual, practical world of honest labor as it actually is, for the sole purpose of properly disciplining, developing, broadening, and rounding out all the faculties of man; rounded, not like a stove-pipe, full of wind, but like a cannon-ball, full of solid metal, sure of its aim and resistless in its force; and the man or the boy that is taken out of this great common school of our Heavenly Father, the actual service and hard work of the shop or the field, for more than half his growing years, is actually robbed of the best and most important part of all possible education for any industrial art or service whatever.

One of the chief evils of this school system is that the book-makers and publishers have assumed about as absolute control of the schools as the "politicians" have of the post-offices; neither teachers nor parents nor committees have any real control over their absolute practical direction. Publishers often pay fabulous amounts to have their books introduced. They will send oily-tongued agents into the country to show the superior merit of their series of books over those in use. He will offer to make exchange—book for book—for all the old books then used in the school. This is simply done to get the pupils to using their line of books, knowing that when once introduced they will then be forced to pay the exorbitant prices at which they are sold ever afterwards, or at least until some other man comes along and takes them up and replaces by others. An agent for a school-book publishing house told us that during one season he took up about 80,000 volumes of school books from the State of Wisconsin. This enormous expense of frequent changing and salaries and expenses of agents have to be paid by the farmers. Books are, of course, generally made by experts. Every expert desires duly to magnify his office and his department: a mathematician naturally thinks that God and nature are nothing but an unsolved problem in mathematics; a chemist thinks they are all in the bottom of his crucible; a linguist or an elocutionist thinks they are all "voice and nothing more;" while a spelling-book maker thinks they are all spelling, and, in English at least, all spelled wrong. Each one wants to make a book on his department: he wants every child to be "thorough," at least in that. He soon finds that it will take a series of books to go over even the elements needful to an expert, and that if you were to begin with a child as soon as he is born, and drill him till he is older than the archangels, he could not become perfect, even in that single department. But he intends to make a thorough beginning, so he crams into his new series of books all the little unimaginable rules and trifles that the human race in twenty centuries have ever thought upon the subject. The first dose is homeopathic; one grain of science diluted by a world full of wind, for very young children; each dose becomes a little more allopathic and stiff and formal, than the preceding: but the trouble is, you never get through with it: you are never done with it; never ready to throw it aside and pass on to something else. A new term brings you flat back against a new series on the same subject: you don't get one dose fairly down before another is ready. All the doses are composed mainly of the three R's, "readin'," "'ritin'," and "'rithmertic." You never seem to get out of that charmed circle.

The book-maker likes all this: the more series there are, the more printing and binding and sales and profits in all respects,—especially as it is morally certain that no two children or pupils of any sort will continue to use the same books in succession; and a totally new series, full of most wonderful improvements, even on the dead classics, is sure to be born at least once a year, and to out-rival everything that preceded it.

A man with much of a family needs to build an out-house for the storing of his old cast-off school-books. He cannot manage, economically, to burn them up for kindling wood as fast as the book-makers want him to buy them. But the main trouble is, they are all made by experts; and they usually, either like commentaries on the Bible, explain everything except the precise point that needs explanation, or adjust their explanation to the wants of a preconceived expert, rather than to those of a common child. What would we say of a child's book on human teeth or eyes, which attempted to embody in it all the little rules and minute facts essential to the expert oculist, or dentist? What of a child's book on the plow, with all the miners', and forgers', and wood-workers', and painters', and holders', and teamsters' and farmers' rules for making, and handling, and using it, embodied in an everlasting series of most thorough and important rules, to be committed to memory by the tyro learner about the plow, in order to make him thorough in his knowledge of it, well-disciplined, and well rounded out? Or what should we say if it was a rule of the school, that every child alike, who took up singing, should advance precisely so far in it before he was allowed to take up anything else, wholly irrespective of his natural taste and aptitude for music? Some might sing till the stars fall, and do nothing else, and still never be singers. Precisely so: some children never would make good spellers, or elocutionists, or grammarians, or arithmeticians, if they were drilled on them to all eternity; while they might all easily excel in some one of these things, or in other things outside of them. The teacher has little chance to get hold of this matter: like the postmaster, he must use the materials actually furnished him, simply because he can get no others; or, if he could, it is doubtful if the community would tolerate him in the change.

We hope these observations may have the desired result of aiding the reformation of the present school system. As it is, we can justly boast of its superiority over that afforded by any other nation. There are needed reforms, however, as the above full description of very much of the present plan clearly indicates. With a few remarks in reference to the teachers, the school and the proper discipline of the school, we will pass to a treatise of agricultural education.

The exercise of the supreme power in a school is generally vested in the teacher, subject to the supervision of those from whom he receives his appointment. We call to mind that in our system of civil government there are three departments—the legislative, judicial, and executive. These in the school are usually united in the person of the teacher, making his duties sometimes trying, and always responsible. He frames the rules of action for the pupils while they are intrusted to his care; he is master to direct, friend to advise, teacher to instruct, and executive to enforce his rules. It is his duty to look after the health, secure the comfort, protect the rights, and preserve the morals of his pupils.

As he assumes to be a teacher, there are those who expect him to be learned, wise, careful, prudent, amiable, gentle, sociable, forbearing, long-suffering, impartial, charitable, diligent, attentive, studious, energetic, polite, commanding, healthy, omniscient, and omnipresent. Such expectations are never realized, and consequently it will not be surprising that he does not give full satisfaction to all his pupils and their parents. Still, it may safely be asserted that as a class teachers do possess at least the desire to do right.

The teacher has rights, it must be remembered, and which are due to his position, his age, and his superior acquirements. He also has feelings as tender, sensibilities as delicate, pride as sensitive, and self-love as strong as any of his pupils, and no pupil has a right to impose upon him in violation of the golden rule. It is not to be expected that he shall be overcome by passion, prejudice, or pride, unless under very strong provocations; but what moral right has any one to exercise his patience by provocation? Teacher and pupils are under the same obligations to each other to be kind, patient, charitable, and forgiving. It may safely be said, however, that whenever the pupils of a school endeavor to do right, no fear need be entertained that any teacher will attempt to provoke them to act differently.

It is the interest of the teacher to make every reasonable exertion to secure the friendship of his pupils. Those who meet him in a spirit of friendliness, and show a disposition to please him will, of course, be more esteemed than those who are indifferent to his feelings and comfort. The teacher will necessarily be more attracted to those who are kind, polite and attentive and who manifest a disposition to make themselves agreeable. To do otherwise would be unnatural. His favorites are those to whom his sympathies are drawn by acts of kindness and respect. But while he may admire and love some pupils for their agreeable qualities, it does not follow that he shall dislike or hate those who have not tried to win his favor. He may be kind, attentive, and faithful to every one in school, and yet he may and must be partial to such as try to do their duty.

The term partiality is often used to indicate a want of fairness on the part of the teacher. If investigated thoroughly, the charge will frequently be found to originate with such pupils as are conscious of their own neglect of duty, and their indisposition to make an effort to merit the teacher's friendship. The teacher is in honor bound to do justice to all his pupils; but that he should be expected to possess an equal regard for all is absurd. Jealousy and ill nature are generally the causes that originate the charge of unfair partiality in school.

Common sense forbids the idea that any teacher should exercise injustice toward a pupil without a cause, and in opposition to self-interest; and yet, when the impression of partiality takes hold of some minds, it is almost impossible by any reasoning to remove it. It is so mingled with passion, prejudice, and pride that its correction seems an almost hopeless task. The sooner such a habit of mind is overcome by the exercise of reason and charity, the happier will all parties be in school.

SCHOOL HABITS. A good education is but little more than the formation of good habits. To insure a systematic training in all that is necessary to fit a young man or woman for good society, time, patience, and industry are required. Good habits must be formed. There are certain rules which experience has proven to be necessary in the management of every good school. These are not merely arbitrary regulations; they are founded in reason, and cannot be dispensed with, if the school shall be made to accomplish the design of its organization. Their observance will insure habits of attention, punctuality, regularity, and self-control, that are an essential part of a good education, while their neglect will certainly entail a life of mortification, annoyance, and failure.

The welfare of the school, the progress of each pupil, and the comfort and success of the teacher depend largely upon the unfailing attendance of every member. There is a moral obligation resting upon each person at school that he shall do nothing to interfere with the rights of his neighbors. It is his duty, therefore, to be present each day, unless prevented by some unavoidable occurrence. The waste of time, the hindrance in study, and the annoyance to teacher and pupils occasioned by unnecessary absence, has ruined many a school; and the habits of carelessness, indifference, and irregularity, arising from the same cause, have blasted the prospect of many a pupil. Self-respect, self-interest, and the love of the right should compel every pupil to spare no effort to secure a constant attendance.

AGRICULTURAL EDUCATION. Not an art is practiced by man which includes a greater variety of operations or involves a greater amount of scientific principles than farming; and yet almost every other art is popularly regarded as far more technical and intricate, and as requiring far higher qualifications, and a far more systematic and prolonged course of preparation for its successful performance. Popular opinion justly imposes a long apprenticeship upon every candidate for any department of mere handicraft, a long course of preparatory study upon every candidate for scientific or intellectual employment, and both an apprenticeship and a course of preparatory study upon every candidate for several of such professions as combine art and science; and yet, with marvelous inconsistency, it, in most instances, imposes no apprenticeship and no special study whatever upon the candidate for an employment far more noble and intricate than any handicraft, and eminently combining the influence of at least two-thirds of all the physical sciences with the most varied manipulations of complex art. How monstrous is it that, while one man is apprenticed two or three years in order to make a shoe, another is not apprenticed at all in order to manage a farm! that while one is required for many years to be both an apprentice and a student in order to make the contents of a statute book bear upon a case of litigation, another is not required to be either apprentice or student in order to make the experience of all countries and ages of the civilized world, and the principles and discoveries of some of the most prominent and complex of human sciences, bear upon the diversified and multitudinous practices of agriculture! One year as a shoemaker's apprentice, and three years as a young lawyer, ought to be every particle as effective as seven years as a candidate for farming; and with not more than one or two exceptions, not an artificer, an artist, or a professional exists, who requires more special training or a larger amount of technical knowledge than a farmer, or who possesses equal facilities to turn a liberal and munificent education to practical account. Were the next generation of farmers all over the civilized world to be educated comparatively with other men in something like the proportions of their callings, human society would at one move experience almost as great a transition as when it passed from the degradation of the feudal ages to the dignity of the nineteenth century. Even an old Roman author, amid the material condition of a proud, vicious, and heathenish empire, had the sagacity to see the paramount importance of agricultural education, and the honesty to utter his astonishment at its neglect. "Nothing equals my surprise" says he, "when I consider that while those who desire to learn to speak well, select an author whose eloquence may serve them as a model; while those who are anxious to dance, or become good musicians, employ a dancing or a music master; in short, that while every one looks for the best master, in order to make the best progress under his instructions, the most important science, next to that of wisdom, has neither pupils nor teachers. We have seen schools established for teaching rhetoric, geometry, music, dancing, etc., and have never yet seen a master to teach agriculture, or a pupil to learn it.

Actual farmers who have had no special training, in multitudes of instances, improve their knowledge and their general qualifications by free intercourse with persons better informed than themselves, by accepting the advantages of example and instruction afforded on the home or model farms of many well conducted estates, by watching the proceedings and receiving the assistance of the agricultural societies of their county or district, by attending any occasional or serial agricultural lectures which professional or scientific gentlemen may deliver in their vicinity, and by making a diligent and discriminating use of one or more of the best books on agriculture. Thousands of the worst instructed class of farmers might by the use of several of these means, or even of any one of them, speedily acquire such knowledge as would enable them to draw 20 or 30 per cent. of additional produce from their farms.

All descriptions of young persons training to be farmers require to spend a large portion of their time upon a farm, to observe with all possible frequency the practices of the farm and the field, to take full and daily part in the operations of every season, and to learn, in a practical manner, the nature and conditions of every piece of labor, from the coarsest drudgery to the nicest and most artistic performance. Mere looking on, mere reading, mere listening, mere occasional acting, or all of these four combined, will far less enable a man to conduct a farm than even teach him to make a shoe or construct a steam engine. Pupil farmers do not require, indeed, to become adepts in every agricultural practice; they do not need to be the best workmen on the farm, the ablest plowmen, the most skillful sowers, the most expert manipulators of the stable and the barn; yet they certainly must acquire sufficient proficiency in every art and process, or at least sufficient practical acquaintance with the tact and method of performing it, and to judge when it is well and expertly done. They must fully obey, and they must know how to command; they must take part in everything, that they may learn to make judicious applications of the grand economical principle of the division of labor; they ought, in fact, to require the same comprehensive views of the operations of the farm as the farmer himself.

Yet mere practical learning, as we have already hinted, will as completely fail to make a man a wise farmer as a mere theory. The pupil, by carefully imitating all around him, may become a very expert monkey; but, unless he learn a reason for every operation, he will never farm like a rational being. His business, in preparing to become a farmer, is to learn the science of agriculture as well as the art, the principles of it as well as the practices. He ought therefore, during the whole course of his practical instruction on the farm, to be receiving explanations of the phenomena which he witnesses and the practices in which he shares, to be soliciting information respecting every matter which he does not clearly understand, and to be exercising his judgment as to the fittest mode of performing operations, the likeliest mode of overcoming difficulties, and the most feasible mode of attempting improvements. When he is under the care of a father or a kind master who farms intelligently, and possesses a fair share of science, he ought to acquire from him a large amount of requisite intellectual instruction; yet even in this case, and unspeakably more, if he be under the care of a mere imitative farmer, he requires the aid of such stores of knowledge as can be obtained only from other sources and by separate study. He needs, in fact, to be scientifically trained with books and by a schoolmaster, not less than to be practically trained with implements and by the farmer.

Whatever any ordinary school can furnish, in the departments of English education, writing, arithmetic, book-keeping, and elementary mathematics, ought, as a matter of course, to be acquired by every son of a farmer, and by every other boy who is likely to become an agriculturist.

The old view that anybody could be a farmer is passing away. Farmers are "looking over the fence" more than ever before; they observe, and imitate when it seems desirable. This awakening of thought has developed into the establishment of various agricultural schools, many of which have been unsuccessful, and for various reasons. Too much was expected of them; the teachers were not trained to their work, and the pupils, in many cases, have been educated away from the farm. The love for farming and farm life must be developed in the child. The home teachings mainly shape the farmer boy's future. Object lessons, instead of book lessons, must interest and instruct the young—and the farm with all its plants and animals offers the very best opportunities for this training of the powers of observation. Study nature and refer to books, and not study books and afterwards refer to nature.

The great lack in the farmer's education is system and balance. In no occupation is there geater demand for independent thought and accurate judgment. To obtain these he must read the best agricultural papers, establish and attend farmers' clubs, take part in the annual exhibitions, and in every way possible meet his fellow farmers, that by so doing he may increase his knowledge.

There is much work for agriculture to be done in the common school. The apparatus required is simple and cheap, and plants, etc., are always at hand. A text-book of the rudiments of farming could be put into every common school with great advantage to every child. Scientific methods should he cultivated in youth; the method is as valuable as the facts. The only reason for this lack of agricultural instruction is the indifference of the people. Every teacher of a district or common school should know enough of budding and grafting to teach the scholars by practical lessons. The leading principles of vegetable physiology, as taught in Gray's First Lessons, may be understood by any intelligent teacher in the course of a few days, in connection with a little voluntary field practice. Young students may understand a great deal about germination by planting beans, peas, corn, wheat, etc., and examining the progress of the young shoots every day. They can try the effect of planting at different depths at the same time. They can trace the length of roots from young trees. A few ligatures about the limbs of trees will show them much in relation to circulation, in the course of the summer. Every teacher should show his pupils how to bud and graft, and to raise plants from cuttings and layers. He should explain the principles to them on which success depends. These things should be well understood by both girls and boys; they will not only prove attractive and interesting, but be useful all their days. Young men spend years in the study of Latin and algebra, which are useful; but one-tenth of this time given to the fascinating and useful arts connected with vegetable growth, would be more valuable for the time devoted. Young ladies study French and crayon work for years, but if they could cut off a few fragments of this time, and give them to some of the arts connected with horticulture, it would be better for their health, their minds, and add much to their usefulness.

As a stimulus and an aid in bringing about this system in agricultural education, schools of a few months' duration, in the winter season it may be, might be held at various points in the State. The nation is safest only when the youth are educated thoroughly; and agriculture is on a sound and permanent basis only when the boys, and girls too, are instructed in the elements of farming.

E. E., "Errors Excepted." These initial letters are written upon bills of purchase or statements of account to keep them open for future correction.

Eels afford light nourishing food, but they are generally considered better from this point of view when fried than when boiled. They should be well seasoned. They are sometimes salted, in which condition they are very wholesome eating. Wash them clean, and cut them in pieces, season them with pepper and salt, flour them, and fry them in butter. Let the sauce be a plain melted butter, with a piece of lemon, or a little fish sauce may be added.

EEL PIE. Make a rich pie-crust, and gut, clean and wash enough eels to fill the dish; season with salt, pepper, mace, etc., to your taste; put in as much water as the dish will hold and cover with the paste.

Eggs. The constitution of an egg exhibits very many and most striking evidences of the design and beneficence of the Creator, in the form of perfect and wonderful adaptations jointly to its immediate purpose of developing, feeding, and maturing an embryo bird, and to its incidental and secondary though scarcely less important purpose of affording food to man and to other animals. Yet so very numerous are both the chemical and the vital processes involved in the transmutation of its minute embryo into a perfect bird, that the exact provisions for some of the more recondite of them have hitherto eluded the scrutiny of the keenest human observation. A certain degree of porosity in the shell permits a comparatively free interchange of the gases of the atmosphere with the evolving gases of the interior; the detachment of a portion of the membrana putaminis at the great end of the egg permits a small and increasing volume of atmospheric air to be stored up there, as in a cell, for the ready use of the developing embryo; the membranous envelopments of respectively the white and the yolk together with their two connecting ligaments, admirably preserve them from intermixture, while both the thinness of these envelopments and the ready permeability of their own interior just as admirably permit an interchange of influences or a mutual reaction of chemical power; and the peculiar composition of the shell most beautifully combines the properties of a strong shield, a porous sheath, a smooth coat, and a frangible or facile doorway; while the chemical elements of both the white and the yolk, besides possessing mighty mutual adaptation for developing the bird, are singularly eminent in nutrition, and exert almost the highest possible power as food both in the embryo bird and upon the digestive system of a human being.

Great chemical changes necessarily take place upon all the contents of an egg during the process of incubation, and if they could be examined and tested one by one, or stage by stage, they would unquestionably unfold a manifold and most instructive display of the subordination of chemical behavior to vital action. When incubation is complete, all the interior has lost its dead matter, and is occupied with a perfectly formed animal, whose organization is as complex, intricate, and wonderful as that of an elephant or of man; the inert mass with its mainly chemical influences has almost wholly disappeared, and a perfect bird, with its mainly vital powers and its multitudinous organic functions, is present.

Eggs of the hen are hatched by being kept at a temperature of 104° for three weeks. Their vitality has been retained after being exposed to a temperature of 10° Fahr., and it is a remarkable fact that the freezing point of new-laid eggs is much lower than that of the water and albumen of which they principally consist, and both of which congeal at about the same temperature. Eggs, too, that have been once frozen, or have been long kept, freeze at the point their constituents would seem to require. The specific gravity of new-laid eggs is from 1.08 to 1.09. By keeping they diminish in weight from evaporation of water, and the substitution of air through the pores of the shell. This diminution has been observed to continue for two years, an egg weighing originally 907½ grains being reduced to 363.2 grains. When they have lost so much weight as to float upon water, they are generally unsound. The preventing of this evaporation by covering their surface with a coating of varnish, wax, gum arabic, or lard, checks their putrefaction. It is said that if every new-laid egg was at once rubbed over with sweet butter it would be a rare thing to see one unsound. Hens' eggs vary so much in gravity that it is a wonder they continue to be sold by numbers instead of weight. A dozen of the largest have been found to weigh 24 ounces, while the same number of smaller ones of the same stock weighed only 14½ ounces. The fair average weight is said to be about 22½ ounces to the dozen. About one-third of the entire weight may be regarded as nitrogenous and nutritious matter, a greater portion than that of meat, which is rated at only from 20 to 28 per cent., while the nutritive portion of the oyster is only about 12 per cent.

Eggs as Food. Raw eggs are gently laxative, and are found to be serviceable in jaundice and obstructions of the liver. Eggs have the peculiar quality of singularly affecting some stomachs, while on others they do not produce the slightest sensation. The white of an egg closely resembles the lymph of the blood; the yolk is an animal mucilage. Eggs yield a mild demulcent and strengthening food; but they are mostly digestible when boiled so long as is necessary to slightly coagulate the greater part of the white without depriving the yolk of its fluidity. Raw eggs are more wholesome than boiled, or even than those lightly poached, which are very digestible. The white of an egg, from its tendency to coagulate into a hard and indigestible substance, is likely to disagree with the stomach of invalids, when the yolk may prove perfectly harmless. Eggs become more difficult of digestion by being kept.

To Preserve Eggs. How to preserve eggs for winter use has long been a matter of great solicitude. Among the processes in use by dealers and others is "liming." This is done by taking slacked lime and salt, a half pound each to a bucket of water. Some dealers use no salt, but instead add to the lime a small quantity of nitre, say a quarter of a pound to half a barrel of pickle. The eggs to be preserved in this solution must be thoroughly tested to be certain that they are fresh. This is generally done by "sunning" them through a roll of paper. The liquid must fully cover the eggs. If they are kept in a cool place they will remain good for several months. Long storage, however, in this way, is apt to make the shells brittle, and impart a limy taste to their contents. "Limed eggs" generally sell several cents lower in the market than fresh ones. The effect of the lime may in some measure be avoided by anointing the eggs all over with lard before putting them in the pickle, though this would be too expensive for large dealers; this plan can be practiced by housewives, and thus they can preserve eggs for six months or more, when stored in a cool celler.

The following is said to be a better method of storing eggs: Select perfectly fresh eggs, put a dozen or more in a small willow basket, and immerse this for five seconds in boiling water, containing about five pounds of brown sugar per gallon of water. Place the eggs immediately after on trays, to dry. The scalding water causes the formation of a thin skin of hard albumen next the inner surface of the shell, the sugar effectually closing all the pores of the latter. The cool eggs, when packed, small end down in fresh salt, or in a mixture of one measure of finely powdered charcoal, and two measures of bran, keep nicely, being found perfectly fresh after having been thus stored for six months.

A French authority gives the following: Melt four ounces of beeswax, and stir in eight ounces of olive oil. Let the mixture cool somewhat, then dip the fresh eggs into it, so as to coat every part of the shell. Wipe off with a cloth. The absorption of the oil by the shell, and the sealing of the pores by the wax, make the treatment perfect. It is claimed that eggs thus treated, then packed in charcoal, and stored in a cool place, have been known to keep perfectly fresh for two years.

Dry salt was the old means for preserving eggs for the household, but experience has proved that it is little better than bran.

A mixture of eight measures of bran, with one of powdered quicklime, makes an excellent packing for eggs for transportation.

A very popular method is to grease or oil the eggs, with fresh grease or oil, place them in salt, ashes, slacked lime, oats, sawdust or bran, and keep them in a dry, cool place, but where they will not freeze. Simple scalding, by dipping in boiling water quickly three times and out, and packing in oats, etc., is also recommended.

If eggs are not stored when perfectly fresh they will not keep under any circumstances. A broken egg stored with sound ones will sometimes endanger the whole lot. In packing, the small end should be placed downward; if in charcoal or other powder they must be packed so that they do not touch one another, the intertsices being filled with the powder. Under all circumstances stored eggs should be kept in as cool a place as possible not to freeze them. Frequent change of temperature must also be avoided.

A modern method, practiced by a few dealers, is to prepare an egg-preserving house, so that it can be kept at a uniform temperatuie through all kinds of weather. This temperature must be as cool as possible, and not reach the freezing point. The eggs are placed point downwards, in cases, or racks, each egg in a separate receptacle. It is said that this plan works to perfection, and dealers have grown wealthy in its practice.

For domestic use, when it is desired to use the liming process, take freshly slacked lime, put into four gallons of boiling water, strain through a coarse sieve, and add ten ounces of salt and three of cream tartar, mixed thoroughly. It is better if allowed to stand two weeks before using. Pack the eggs in stone jars as closely as possible, taking care not to break any of them, and pour the pickle over them. Float a board on the surface to keep them all under. Set in a cool place. It is claimed that, thus treated, eggs will keep for one to four years.

Boil four or six dozen eggs in a capacious sauce-pan until they become quite hard. After carefully removing the shells, lay them in large-mouthed jars, and pour over them scalding vinegar, well seasoned with whole pepper, allspice, a little ginger, a few cloves and garlic. When cold, bung down closely; in a month they are fit for use.

Eggs, when stored in charcoal, bran, or salt, or in holes in boards, or in pasteboard cases, should always be placed the small end downward, as the more recent experiments have demonstrated this to be the safer method.

Eggs, to be transported for a long distance, should either be packed in the regular pasteboard cases, or in boxes or barrels, between layers of finely-cut, dry, sweet straw or hay, care being taken that they do not touch the sides of the package or each other. Oats may be used for packing, and the grain disposed of at a price after the eggs are removed.

To tell good from bad eggs: Put them in water enough to cover them; all that lie flat are good; the large end will rise of those that are bad. Good eggs, also, when held up toward the light, seem more translucent than spoiled ones. The large end of a fresh egg is said to feel a little warm to the tongue, when touched with it.

An egg-tester may be made by fitting a looking-glass in the bottom of a cigar box, and cutting round holes in the cover, just large enough for the eggs to fit, and not drop through. Set in, large end downward. Make a slit near the end of the cover 1 by 2 inches to look through. With the egg in place, and the box held in a strong light, a peep in the glass will show the fertile eggs to be dark and opaque, and the unfertile ones transparent.

To determine the age of eggs, dissolve 4 ounces of salt in 1 quart of water, and immerse the egg. If it is only one day old it will sink; if three days, it will just begin to float in the liquid; if more than five days, it will come to the top and project above it in proportion to its increased age.

To determine the sex of eggs, it is said that those producing males are wrinkled at the small end, at least more than those which would produce females.

To Boil Eggs. Three minutes will boil them very soft; five minutes will cook hard, all but the yolk, and eight minutes will cook them hard all through.

A good plan is to put the eggs on in cold water, and as soon as the latter boils the eggs are soft-done, with the white portion less hardened, in proportion to the yolk, than by putting them in boiling hot water at first. Besides, by this method, one does not need to watch a time-piece. To prevent the contents of cracked eggs from oozing out when boiling, rub them with moistened salt.

Poached Eggs. Have boiling water in a shallow pan, break the eggs separately in a saucer, and slip gently into the boiling water; when all are in the water, place the pan over the fire until the white of each is perfectly set; remove with a slicer, and lay on buttered toast or broiled ham.

Scrambled Eggs. Have a spider hot and buttered; break the eggs into a dish, being careful not to break the yolks; slip them into the spider, add a very little salt, with butter the size of a nutmeg for half a dozen eggs, or three tablespoonfuls of rich cream. When the eggs begin to whiten, stir carefully from the bottom until cooked to suit.

Egg-Balls, for made dishes or soup. Pound the hard-boiled yolks of eight eggs in a mortar until very smooth; then mix with them the yolks of four raw eggs, a little salt, and a dust or so of flour to make them bind. Roll them into small balls, boil them in water, and add them to any made dishes or soups for which they may be required.

Frozen Eggs can be used for all ordinary cooking by thawing them in cold water. Do not use for cake, as they will invariably make it heavy.

Egg-Nogg. Take one tablespoonful of fine sugar, dissolve with water; 1 egg; 1 wineglass, more or less, of brandy, rum, whisky, or other spirit, in proportion desired, or according to the strength of the liquor. Fill the tumbler one-fourth full with shaved ice; shake the ingredients till they are thoroughly mixed, and grate a little nutmeg on top.

Egg Plant. This is an interesting vegetable to cultivate, being ornamental as well as eatable. The seeds may be sown in a hotbed in March and the young plants potted when an inch or two high; then transplant in open ground in rows two feet apart each way; manage, however, so as not to transplant before warm weather is established.

Large Purple Egg Plant.

VARIETIES. *Long White China.* Delicate and beautiful; late.

Very Early Dwarf. A new French variety of long purple.

Round Purple. Medium size; well known.

Large Round Purple. Very popular.

Long Purple. Earlier and more productive, but smaller than the Round Purple.

Black Pekin. A new variety of Round Purple with blackish violet leaves and very large fruit.

New York Improved. Extra large and choice.

Scarlet China Guadaloupe. Striped and white are ornamental varieties.

TO COOK EGG PLANT. Choose the medium-sized fruit, cut it in slices a little more than a quarter of an inch thick and remove the skin. Sprinkle salt on each piece, put it in a dish and cover with water, placing a plate on top to keep it under. Leave it in this water for an hour or two to draw out the bitter taste; then wipe each slice dry, dip it in beaten egg; put in fine cracker crumb; season with a little pepper, and fry in equal parts of hot butter and lard until it is done to a light brown. The lard should be heated in the frying pan, and the butter added just before putting the egg plant in. Do not cover while cooking, as the steam would prevent that crispness which is a feature of nicely cooked egg-plant.

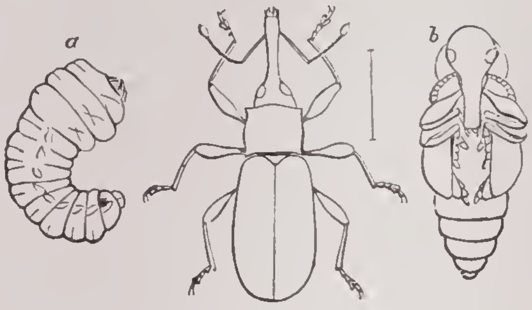


FIG. 5.—*Elm-Tree Curculio.* (Magdalinus Olyra.)

EGG PLANT AU GRATIN. Peel and cut them in slices lengthwise, arrange them in layers on a well-buttered tin, previously rubbed with garlic. Put between the layers a sprinkling of fine bread crumbs, chopped parsley, sweet herbs; add some melted butter; and a sprinkling of grated cheese and a few baked bread crumbs; bake in the oven and brown with a salamander.

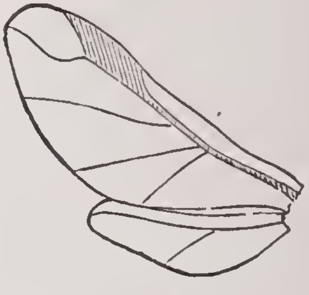


FIG. 4.—*Wing of Elm-Tree Louse.* (Tetraneura ulmi.)

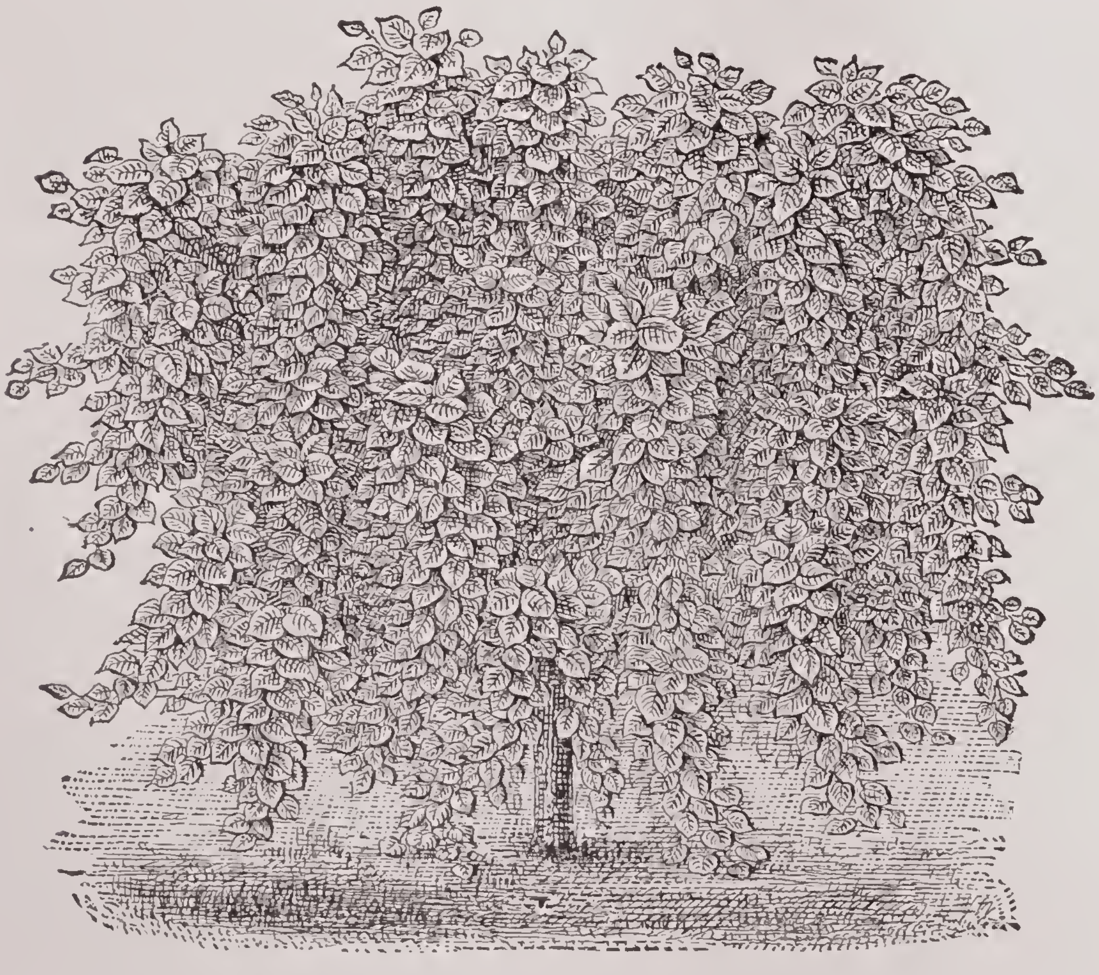


FIG. 1.—*Camperdown Weeping Elm.*

Elder, a well-known shrub with a pith in the stem. All parts of the plant have been used medicinally, to aid in sweats, etc., but the flowers and fruit are the principal parts used. The berries are sometimes cooked and eaten, especially in pies. To make elder wine, see Wine.

Elecampane (el-e-cam-pane′), a plant having a flower like a small sunflower. The roots have been much used in herbal medicinal practice as diuretics and expectorants, but they have lost much of their medicinal celebrity and are now esteemed of but little value by many.

Electricity: see Lightning, Lightning-rods and Hygiene.

Elevator, a belt mounted with cups for elevating grain; also, the building in which grain is thus elevated or stored.

Elm, a well known forest tree, highly prized as an ornamental and shade tree. The white elm is by far the most abundant; the red, or slippery, elm is rare, and the corky elm is also rare.

The greatest objection to the elm as an ornamental tree is its liability to be infested by insects, the principal of which we figure in the annexed cuts, giving magnified views of eggs, larvæ, wings, legs, antennæ, etc., as well as the appearance of their work on the leaves.

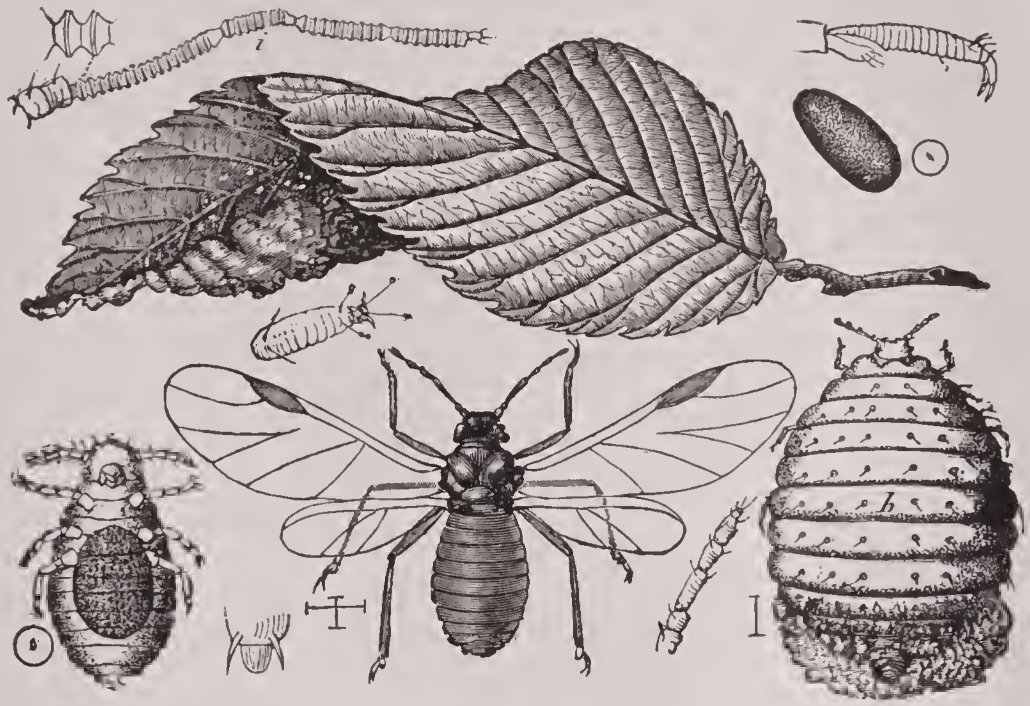


FIG. 4.—*Elm Gall Louse.* (Schizoneura Americana.)

The Camperdown weeping elm is a variety grafted from the Scotch or Wych elm. It is of rank growth, the shoots often making a zigzag growth outward and downward of several feet in a single season. The leaves are large, dark green and glossy, and the tree forms one of the most picturesque objects on the lawn. See Fig. 1.

Elm Bark, SLIPPERY, when scalded with hot water makes a useful poultice for irritable wounds, sores and ulcers. A decoction of the bark will answer every purpose for which flaxseed, or linseed, is used or recommended, as in diseases of the kidneys and bladder, produced by the use of Spanish fly, and from over-dosing with rosin and other diuretics. In diarrhœa, in all animals, slippery-elm tea or decoction will serve a good purpose, by sheathing the bowels, which are so apt to become irritated and inflamed in violent super-purgation.

Emaciation (e-ma-she-a'shun), wasting away of the flesh on account of disease.

Embroidery, fancy needle work.

Embrocation, oil or medicated liquid which is rubbed upon a diseased part; also, the act of rubbing a diseased part with a liquid.

Emery, a granular mineral mixed with oxide of iron, often pasted upon the circumference of wheels for grinding and polishing metals.

Emery Wheel, HOW TO MAKE: Provide a solid wheel, made of soft wood, and of the size you wish. Turn the wheel true and then turn rounds or hollows in its face to suit the tools which you wish to grind. Then prepare some of the best glue, and while hot and thin, put it upon the face of the wheel with a brush. The first coat should be a light one, and when it is dry, another should be applied, and as quickly as possible sift as much emery on it as the glue will hold. When this is dry another coat of glue and emery should be applied. We do not know of any process to make the powder solid.

Emetic, a substance which, introduced into the stomach, produces vomiting. The cleanest and simplest is warm water; next, salt and warm water. The most popular medicinal emetics are the following: No. 1.—Ipecacuanha wine, ½ ounce; water, 1 ounce; simple syrup, ½ ounce. Mix. For a child, 20 drops, or more, every quarter of an hour until vomiting ensues. An adult may take from ½ to 1 ounce. No. 2.—Lobelia, 4 ounces; spirits, a pint; infuse for a week or ten days and it is fit for use. This tincture is an efficient and gentle emetic. No. 3.—Give tincture of lobelia, ½ teaspoonful every half hour until vomiting is produced.

As horses, cattle and sheep cannot vomit whilst the stomach remains entire, emetics are of no use in veterinary practice. In case of rupture of that viscus, however, vomiting is occasionally seen. Emetics are useful in diseases of the dog and swine. Tartar emetic or sulphate of zinc, given in from two to five grain doses, will cause dogs and swine to vomit.

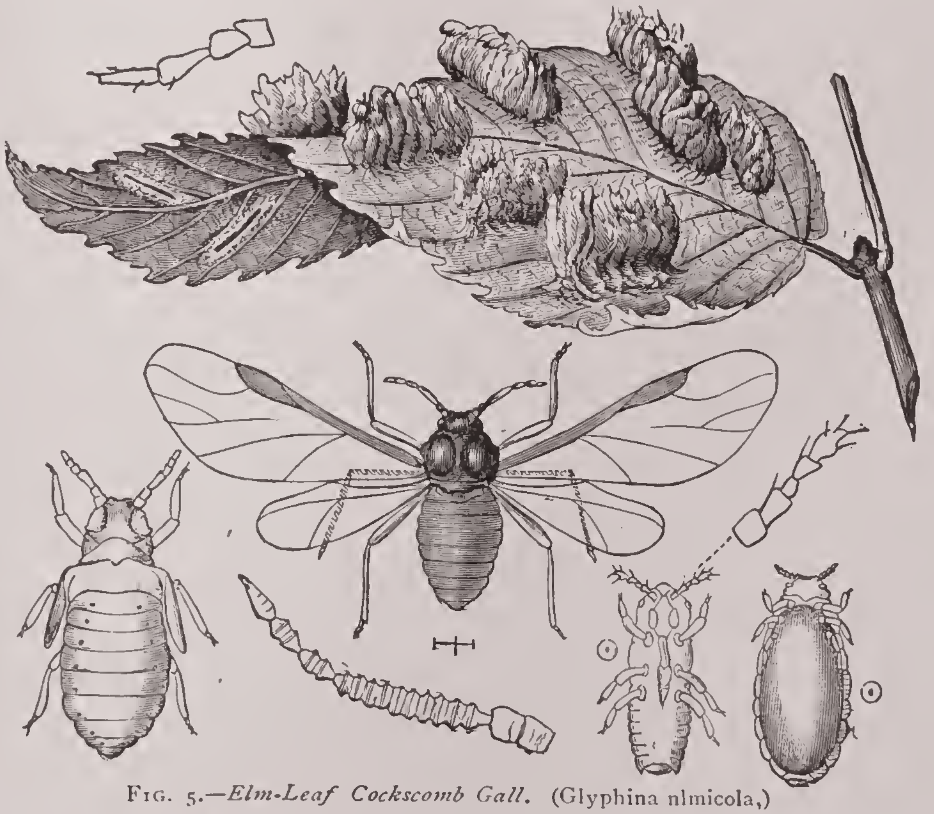


FIG. 5.—*Elm-Leaf Cockscomb Gall.* (Glyphina nlmicola,)

Engine, a machine for applying power; more specifically, the machinery by which *steam* power is communicated to other machinery or apparatus; in a still more restricted sense, it is, in contradistinction to the boilers, fly-wheel, etc., the cylinder and piston-rod, with their immediate attachments.

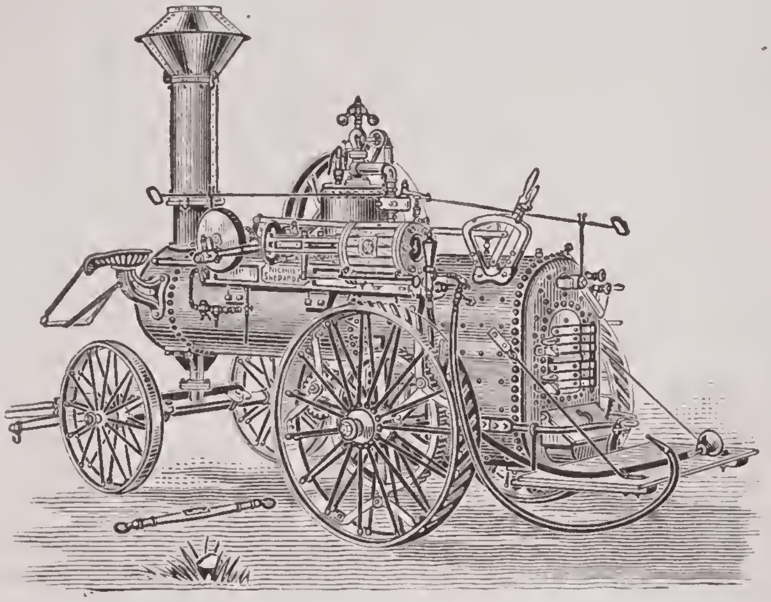


FIG. 1.—*Traction Engine.*

A "portable" engine is one which is fixed upon wheels, to be easily moved from place to place.

A "locomotive" engine is one that is propelled by its own power from one place to another. A locomotive for farm work must plow or draw loads, in which case it becomes a "traction" engine. ("Traction" signifies drawing.)

A "stationary" engine is fixed to one place, with more or less masonry, and is therefore difficult to be moved to another locality. This is the most economical form where great power is required, in one place.

Fig. 1 gives a correct view of one of the best farm engines in the market. It has a complete water front and water bottom, a heavy wrought-iron axle extending completely under the fire-box, double wrought-iron doors, strong stay bolts around fire-box, a splendid pump made entirely of brass, a surface blow-off, strong and elegant iron drive wheels, with eight-inch corrugated tires, a patent-lever throttle valve, controlled from either end of the boiler; extra large fire-box, double thick flue-sheet, copper thimbles on every flue, perfect safety from fire or explosion, great durability, elegant workmanship, beautiful finish, and superior material.

Some manufacturers frequently advertise an engine weighing several hundred pounds less than another, and at a proportionate decrease in price. On a superficial view, this light weight may seem to be an advantage; but it is found, on examination, that in every case this decrease in weight (and consequent cost to the manufacturers) is effected entirely in the boiler, which is cheapened in every possible way, such as using a thinner and inferior quality of iron in the shell, and "setting up" or swaging the seam to make it look thick; by using light, punched flue-sheets, which spring and warp with every change in the temperature and pressure of the boiler; by using cheap flues (without copper thimbles), which soon corrode and leak; by making a small fire-box with insufficient fire room, which necessitates constant "forcing" to make steam enough, and consequent burning and straining of the crown-sheet and other parts; and by using cheap cast-iron fronts, doors, dome, etc., which add no strength, but, on the contrary, seriously detract from the efficiency. Yet one of these "Cheap John" boilers will look well and often pass muster among the inexperienced buyers of farm engines. It takes a few months' use to disclose its weakness and defects. It is perfectly easy for the manufacturers of these cheap engines to warrant them to do certain things or perform a certain amount of work, such as driving a separator, etc. They send their experts, who understand exactly how to manage them to the best advantage and get the highest results, and they can thus make them work long enough to capture the purchaser's money or notes, and that is all they care for.

The engine represented by Fig 2 is one of the best for threshing, running a light saw-mill, etc., and is made with the same care as Fig. 1, and by a well known responsible firm.

All owners of large farms find it a great economy to possess a portable engine, and generally one of the "traction" kind. "Small" farmers, too, often find it a convenience to obtain from their more fortunate neighbors the temporary use of such power. Sometimes more power is wanted than can be well afforded by a portable engine, and in nearly all such cases the need is so local that a stationary engine fully supplies it, as in running

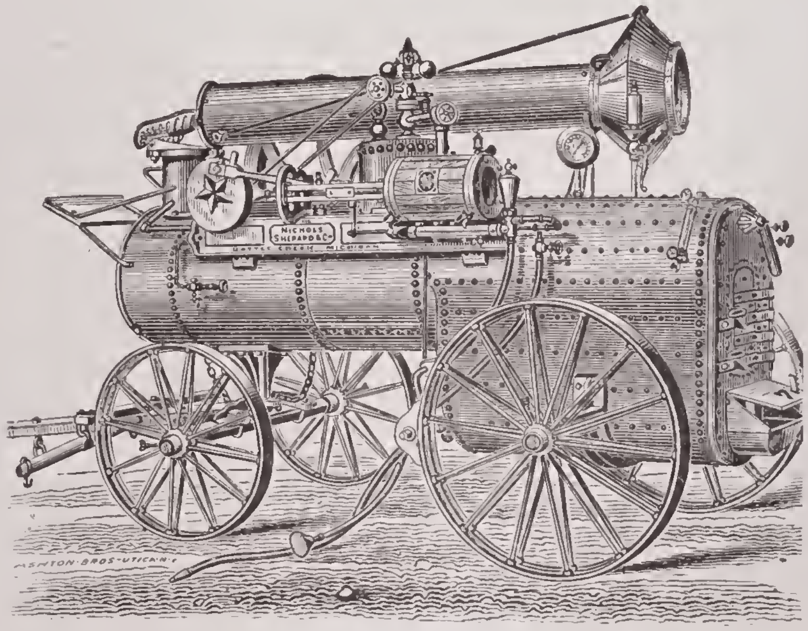

NICHOLS SHEPARD & Co.

FIG. 2.—*13-Horse-Power Traction Engine.*

large mills for sawing, grinding, etc. Fig. 3 is a cut of a good stationary engine, furnished, with boiler (Fig 4), by Messrs. Willard & Co., Chicago. These boilers are tubular and set in brick work. Each boiler is complete, with full fire front, grates, skeleton arch, safety valve and blow-off cock, water column with syphon, steam gauge, water glass, and compression gauge cocks, hand holes and hand hole plates and crabs, holes for pipes cut and threaded. Boilers are so constructed as to be set as "return flue," by which the heat passes once along the boiler on its under side, and returning through the flues passes out of the smoke stack at the front end right over the fire. This is well known to be the most economical of fuel of all methods of setting a boiler. The boilers are made of first-class charcoal hammered No. 1 iron, with flange iron heads and the best lap-welded wrought iron flues, and are hand-riveted in the most approved manner. All these boilers are tested by hydrostatic pressure before leaving the shop, under pressure much greater than any steam pressure they are ever expected to carry, and every precaution is taken to ensure them against explosion in case of neglect. The engraving shows brick torn away to indicate manner of setting grate; also skeleton arch in the rear.

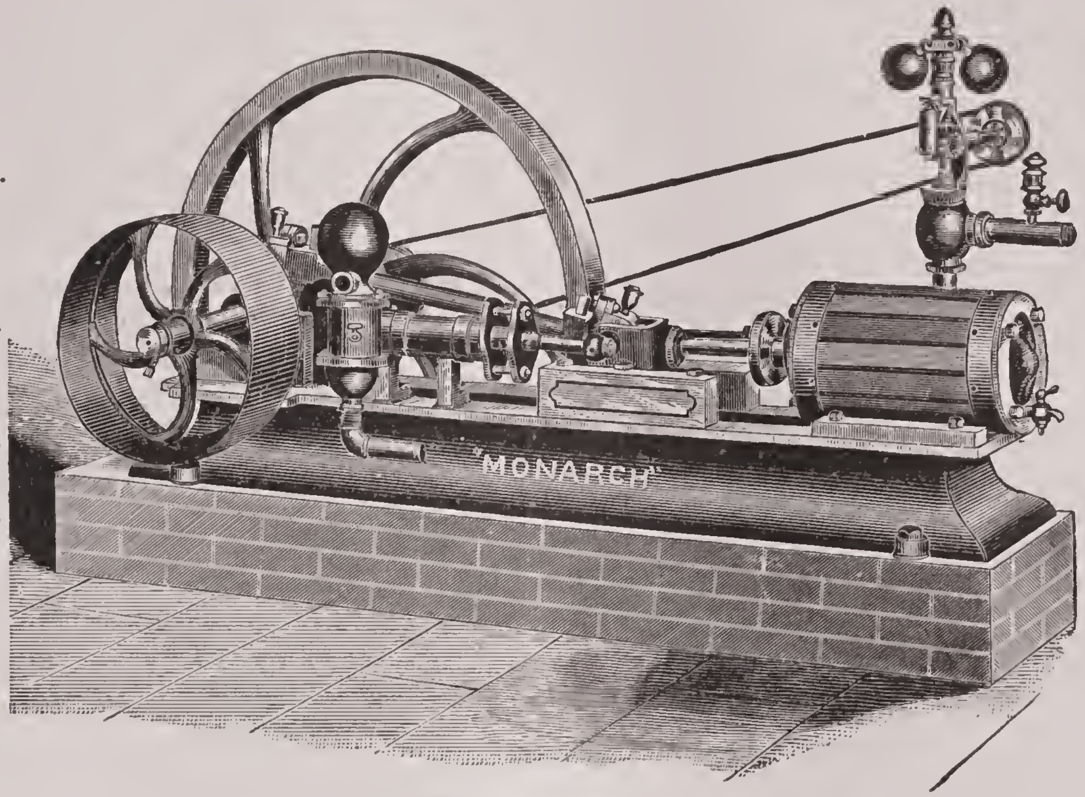


Fig. 3.—*"Monarch" Horizontal Engine.*

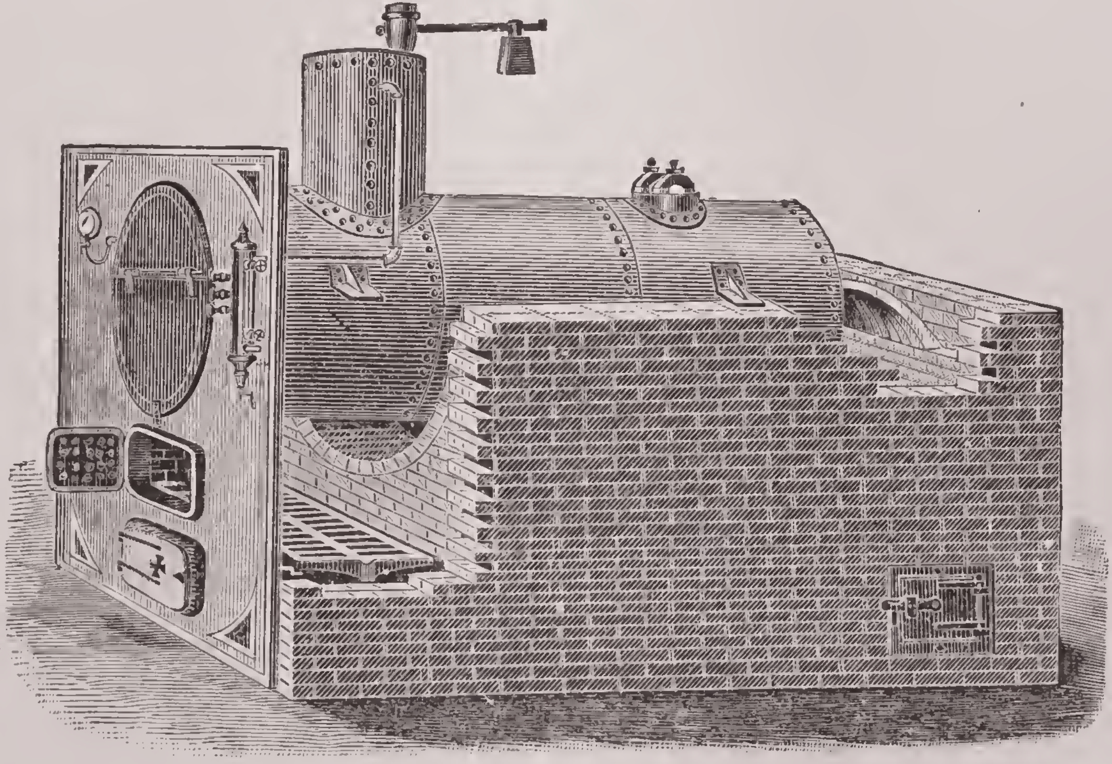


Fig. 4.—*Horizontal Tubular Boiler.*

Ennui (ong-nwe′), mental satiety and weariness; lack of disposition to entertain or to be entertained. In an extreme case, the patient is tempted to commit suicide, or at least wishes he were dead. This is really a morbid condition, brought on either by too much mental labor, or by some form of intemperance. It is a disease, and instead of repelling it with intoxicating beverages or other drugs, one should apply all the resources of general hygiene, the most important of which, in such cases, are, perhaps, a plenty of sleep, and a journey.

Engrail (en-grail′), to variegate or spot, as with hail; to indent or make ragged at the edges, as if broken with hail.

Ensilage (en-si-lazh′), preservation of fodder in its green and juicy state through the winter, in caves or out-houses called "silos." These are of two kinds—those in the ground without masonry, and those made of masonry or concrete, either in pits or above ground. The earth silo has been used successfully in this country, but masonry is preferable, and should always be used by beginners in the practice of ensilage.

In using the simple earth silo, the sides are lined with straw, standing so that the fodder will slide down as it settles. The bottom is floored with plank. The green fodder is thrown in and trodden down. When the pit is full, round up the top, and cover it with a thin layer of long straw. On this, place a covering of tarred roofing felt, and pile on earth till it is about two feet thick. An earth trench can also be lined with boards.

WOODEN SILOS. There is no difficulty about making wooden silos; they require, however, more compression to prevent air from entering through the joints. The bays in the barn can be boarded up and down with matched flooring. The moist ensilage will keep the joints tight and it will keep well. The cover must be loose, and weighted so as to make a continuous pressure. But this silo requires an elevation of the cut fodder, and should the barn burn the winter supply is lost. Wherever it is possible, the cellar under the barn should be utilized if the barn be large enough to serve for a cover, and for the working place for cutting up the fodder. In the Southern States wooden silos are often built in the fields with double thickness of boards and a coat of tar between. The weight used may be cord wood, which becomes more valuable as it dries. These silos have doors through which the ensilage is excavated from below. The best silos, however, are built specially of masonry or concrete.

CONCRETE SILOS. For a silo 12 feet by 20 feet (or longer) and 14 feet deep, which would hold 72 tons, or sufficient for ten cows six months with full rations, the concrete walls should be 14 inches thick at the bottom and ten inches thick at the top of the side walls, with the bevel on the outside of the wall, and the end walls 12 inches thick top and bottom, the inside being perpendicular and smooth, so that the plank covering may settle with the ensilage. The concrete wall is stronger than an ordinary stone wall, and for this short silo, 14 inches at bottom is thick enough. It is not best to go any deeper in the earth than can be well drained, and a trench should be cut on the outside of the wall, six to ten inches deep, all around, to carry off all water that may reach this depth. If the land around the silos is nearly level, it is best to go only so deep that the bottom of the wall will be below frost.

Having excavated the earth as deep as the wall is to go, 15 feet wide and 23 feet long, then set the standards for the boxes to form the concrete walls in. It will require 20 standards three by six inches, 15 feet long (if the walls are to be 14 feet high), of straight-grained timber. Those standards intended for the inside of the wall should be joined straight on one edge, so that the wall may be made very straight and plumb on the inside. There will be three standards upon each long side—one at each corner and one in the middle. The other edges of these inside standards will be 11 feet 9 inches apart; and as the boxing plank are one and a half inches thick, this will bring the walls just 12 feet apart. The outside standards will be opposite the inside ones, and just three inches farther apart than the wall is thick, so that when the plank are placed inside it forms a box 14 inches wide at the bottom, and the bevel or slant on the outside of the wall is made by bringing the outside standard four inches nearer the inside standard at the top. The end standards will be parallel with each other, and 15 inches apart. These standards are held together by nailing a lath under the bottom ends and a bracket across the top ends, holding the side standards 17 inches apart at the bottom and 13 inches at top. Then, when the standards are set up, and the inside standard plumbed very carefully, and both stay-lathed to hold them firmly in position, and the standards placed all around the proposed silo, it is all ready for fitting in the boxing plank. These boxing plank should be straight-grained hemlock or pine, 13 inches wide, and a half inch thick, and may be the whole length of each side and end, or, if more convenient, the sides may be two planks long, and the outside end plank will require to be 14½ feet long, but they may run by the ends of the side planks. The outside of the ends must be plumb, so that the outside plank of the long sides can be raised, but the end walls being shorter, 12 inches thick is enough of strength, and has the same material per foot of surface. When these boxing planks are placed, there will be a continuous box, 14 inches on the sides and 12 inches on the ends, around the silo.

Water lime concrete is the only concrete suitable for silos, as it requires a strong, air-tight, smooth wall and one that will stand moisture to some extent. This kind of wall is easily made air-tight, and is built cheaper than an ordinary stone wall. It is only necessary to use water lime or cement enough to completely coat the particles of sand, so as to cement them together, and this becomes a cement to fill in spaces among large gravel or between stones. The cement is made by mixing one part of water lime with four of fine sand, while dry, so that the lime and sand can be evenly mixed. Then work it into mortar, and if you have coarse gravel and no stone you may put in five or six parts of gravel, and this will be sufficient to cement all together. The gravel is best mixed in the mortar bed, but it must be used at once, as such mortar sets in a few minutes after wetting. But if you have rough stones of any kind, cobble or flat stones, they can be worked into the wall to good advantage, and save cement. When stones are to be worked in, put one or two inches of thin mortar in the wall box, then bed into this mortar a layer of stones, keeping them back a half inch from the boxing plank, so that the cement may be tamped all around the stone, leaving a smooth surface on both sides of the wall. This cement is a poorer conductor of heat, cold and moisture than stone. A properly built concrete wall never shows frost on the inside. In many parts of the country, thin, flat, irregular stones are found in abundance, and these are well adapted to concrete walls, it requiring only a thin layer of concrete mortar between them, and the walls become solid in a few days. But with these flat stones, it is better not to bring them quite to the boxing plank, but to let the concrete come over the edges so as to form a smooth surface.

When the concrete wall is laid with stone, sand and lime, as stated, so large a proportion of stone may be worked in that the water lime will be only one-tenth of the wall, and the same when the wall is made of sand and coarse gravel; so that, to find the amount of water lime required, count one barrel to 40 cubic feet of wall to be built. If water lime is very expensive, and you have flat stones, no matter how irregular, you may use quicklime after you get one foot higher than the earth will come against it. One of quicklime to five of sand will make excellent mortar to lay these stones in, doing the work in all respects as above stated. The concrete should be well tamped into the boxes, filling all crevices between the stones, and solid against the planks. Water lime will set hard enough so that these boxing planks can be raised 12 inches every day. That is, if you fill the box all around the silo in one day, the next morning you may raise the boxing planks where you began the day before; and as you fill, raise section after section of planks till you get around again. This may be repeated each day till the wall is completed, provided the mortar sets in the usual time. But if quicklime is used, this sets slower, and will take two or three days to become strong enough to raise the plank. It will be noted that the planks are to be 14 inches wide, but are raised only 12 inches, which leaves a lap of two inches on the wall below, keeping the sides of the wall smooth and even. The proposed silo will have 952 cubic feet in it, and requires 22 barrels of cement, of the Akron or Rosendale brand. This cement in many places will cost from $1 to $1.25 per bushel.

About the only other cost of the wall is the labor, which can be done by common laborers. The standards can be set by any one who can use a level and plumb. When the walls are completed, take a seasoned board as wide as the wall is thick, tar one side, and turn the tarred side down upon the wall. This will prevent the moisture from rotting the plate rim placed on top of the wall.

The roof placed over the silo must be elevated some three feet above the plates so as to give head-room for filling the silo full. This may be done by framing short posts into the timber on top of the wall, and placing light plates on these, upon which the roof is to stand. It will be seen that this silo can be built, by many farmers, with only a small expenditure for cement, shingles and nails, all the rest of the materials being from their own farms. The bottom of the silo is usually cemented, to prevent moisture from rising.

The drainage so as to avoid pressure of water is very important, as the slightest in-road of water will cause the mass to mould as far as it penetrates. The contents of a silo will be about 50 pounds of compact ensilage to the cubic foot. In the prairies the natural ravines with stone bluffs will serve with little expense for silos, and the cattle carried over the drought and winter seasons.

The cover of the silo should be laid directly upon the ensilage without any straw between, and care should be taken that the pressure should be uniform. Make the cover of two-inch plank, matched and battered in sections of three feet, the battens put on with screws and projecting, which will keep them level. The ensilage will settle about one quarter, and if the walls are smooth and free from any projections it will not require any trampling. The less trampling the better, for when the juice is out, the air enters. For this reason it is important to cut the maize when in full juice, while the pollen is falling from the tassel. The screws and levers suggested by some inexperienced people are entirely unnecessary.

The ensilage should be piled up in curbs or sides above the silo, about one-third the depth of the silo; these sides should be firm, but movable; the cut fodder should be leveled with care, and the cover adjusted; so that it will be sure to press with uniformity, continuously, and not leave any garrets under it for the air to lodge in. Upon this cover will be found a convenient place for piling sacks of grain meal, as there will not be steam enough to stain the sacks; or posts or beams will answer. It was formerly considered necessary to use great pressure in order to squeeze out all the air contained in the cut fodder (about 100 pounds pressure to square foot), but it has been found by experience that when cut ⅜ to ¾ of an inch long and in full juice, the shrinkage of fodder compacts it sufficiently close without any great weight besides weight of cover. If the crop has dried so as to show pith, the air has already entered its cells, and it would be well to increase the weight.

It is probable that the practice will become more general of covering with earth instead of any other cover. This has the advantage of avoiding all unevenness, but it requires some watching for cracks. The earth will cake so that it can be removed without trouble and thrown in the manure heap.

In either kind of silo the fodder should be fine enough to pack close; the finer it is cut the better is the preservation. It should be taken from the silo the evening before it is fed, in order that it may have 15 hours to become alcoholic. Eight hours later it will have passed the proper limit of time, and will rapidly spoil as food. It should never remain over 48 hours out of the pit without being fed.

The advantages claimed for the ensilage system are: It enables the farmer to store green fodder, palatable and nutritious, for winter use; it provides him a way to raise a large quantity of fodder to the acre, cornstalks being the crop grown late in the season for this purpose; the increased product enables the farmer to feed a large number of cattle, and thus he can make a larger quantity of manure.

Epidemic (ep-i-dem'ic), prevailing among the people: said of diseases, such particularly as small-pox, Asiatic cholera, scarlet fever, measles, hooping-cough, influenza, etc., some of which are contagious (see Contagion). The epithet "epidemic" signifies "upon the people," and properly designates prevailing diseases among human beings, while the term "epizootic," signifying "upon brutes," is the corresponding proper designation of prevailing distempers among the lower animals. Yet many writers speak of epidemic diseases in reference as much to brutes as to men.

Epilepsy, a violent nervous disease in man and in domestic animals. Among men it is known by the following symptoms: Rigidity of the muscles, distorted countenance, purple color or ashy paleness of the skin, rolling of the eyes, often finally fixed, as it were looking at some point within the forehead, protrusion of the tongue, champing of the jaws, loss of consciousness, hurried breathing and frothing at the mouth; the fit is followed by a stupid condition for some hours. In most cases the mind of the patient is affected for life. Treatment: During the spasm, nothing; afterward, to prevent its return, cold water to the head and hot applications to the feet; or a teaspoonful every five or ten minutes of the following: One pint each of lobelia tincture, prepared from the seed, tincture of myrrh and nervine tincture: the latter is composed of extract of cypripedium, 1 ounce, oil of anise, ½ ounce, camphor ½ ounce, and tincture of garden lettuce, 1 pound; or brom. potassa, 800 grains, bicarbonate potassa, 90 grains, tincture columbo, 2 ounces, water, 3 ounces. Dose, one-half teaspoonful in a little water three times a day, before eating. Of course a physician will be called in all such frightful attacks as these.

Epizootic (ep-i-zo-ot′ic), prevailing among animals; said of certain diseases, as Texas (or splenic) fever, hog cholera, distemper or influenza, chicken cholera, etc., some of which are contagious, or infectious. See Contagion, and Epidemic.

Epsom Salt, the sulphate of magnesia. This is a mild and safe cathartic, producing watery stools. It also acts as a diuretic and a refrigerant. It has been popular in fevers and inflammatory affections, in colic and for constipation. The medium dose for a person is an ounce, and the most agreeable form for taking it is a solution in carbonic-acid water and lemon syrup.

Epsom salts is a valuable medicine in diseases of cattle and sheep. No other purgative should ever be thought of or given to either cattle or sheep. Even supposing other purgatives to be as good, none certainly can be so cheap as Epsom and Glauber salts, or the sulphate of soda. For all purgative purposes, the one is as good as the other. Salts should be largely diluted with water: for the quantity of fluid given with them, facilitates their operation. In domestic practice, half an ounce of salts, in one tumbler full of water, will operate as strongly as one ounce, in half the quantity of water.

DOSES. For ordinary-sized cows, one to two pounds is the dose, mixed with four quarts of cold water, one ounce of ginger in powder, and the whole sweetened with molasses or coarse sugar. For average-sized calves, two to four ounces; for sheep, four to six ounces. A few drops of commercial sulphuric acid, say 20 to 60 drops, will greatly remove the nauseous taste.

Equestrian, pertaining to horseback-riding; also, a man who rides horseback. An "equestrienne" is a lady who rides horseback. See Horseback Riding.

Equine, pertaining to the horse genus.

Equity (ek′wit-y), justice. A "court of equity" is one held to supply deficiencies of courts of law, in order to attain the ends of justice.

Ergot, a very poisonous fungus, which grows on diseased rye,—sometimes, though rarely in this country, on other plants,—and is known by its honey-like appearance in the latter part of May, enlarging the grain, and finally turning brown. It is nicknamed "honey-dew." It is supposed by some to be an excrescence similar to the oak-apple and the nutgall, and to be occasioned by the puncture of some insect. By others it is thought to be a monstrous development, or morbid swelling of the seed, occasioned by some disturbance in the organs of circulation or secretion. Still others think it a foreign vegetable growth, occasioned by a parasitic fungus. Whatever be its origin and its physical nature, it exerts a dreadfully noxious power upon the system of man or brute who receives even a small portion of it in their food. It has been ascertained by experiments upon many of the lower animals, to produce the most horrible gangrenes, rotting of the extremities, internal tortures, and death. It has been known to cause sloughing and kill many persons who have eaten grain or flour infected with it. It is supposed to have been the cause of dangerous epidemics which have at various periods scourged the poor in parts of France. If a farmer wishes to keep himself and family and all his stock from being poisoned by it, he must look out for it in May, and destroy all infected heads.

Ergot, in the hands of cautious and skillful practitioners, is a very valuable medicine for rousing weak or exhausted uterine action in cases of prolonged and difficult labor; but it is by far too critical in its proper use, and too dangerous in its misapplication, to be ever safely prescribed by persons of small professional education or of raw and youthful experience. It has also been very beneficially used in cases of difficult parturition in the mare, the cow, and the sheep; yet it ought never to be administered to any of these, especially the cow, except in cases of extremity.

Ergot in rye occurs most frequently in wet and stiff land, and may probably be either much increased by raising the crop on soil which will keep the roots constantly moist, or much diminished by raising the crop on naturally thirsty soil, or on land that has been thoroughly sub-soil-drained. When ergot has, in any district, been detected in wheat, the health of the whole community loudly demands the thorough draining of every field on which wheat may at any time be growing.

Erysipelas, a general fever, attended with rapidly spreading inflammations of the skin, characterized by redness and swelling. Sometimes about the third day little blisters appear which contain a yellowish fluid, but often no eruption appears, and the disease "strikes in," often becoming chronic. This is another disease for which a physician should be called.

Esculent, any plant whose roots, stem, shoots, leaves, or other bulky parts are suitable food for man. Familiar examples of esculents are carrots, turnips, and all our common garden vegetables.

Escutcheon, in dairying, is the direction of the growth of the hair on the hinder portion of a cow's bag and adjacent parts, as an index to her qualities as a milch-cow. See "Milk-Mirror," page 277.

Essence, the virtue of any medicinal or flavoring herb, drawn out either by boiling, by soaking in alcohol or oil, or by distillation. A real essence, strictly so termed, requires the complications of a scientific laboratory for their proper preparation, but many substitutes can be prepared at any home by making extracts (see Extracts), or pulverizing the dried herb, root, or whatever is desired.

ESSENCE OF GINGER. Grate and put into a quart of brandy, 3 ounces of fresh ginger, with the yellow part of the rind of a fresh lemon; shake it up well, and daily, ten days, when it may be used. It is nice for flavoring many kinds of sweetmeats; and a little of it mixed with water, or put on a piece of sugar, subserves all the purposes of ginger tea, and is far more palatable.

ESSENCE OF LEMON. The best way of obtaining the essence of lemon peel, is to rub all the yellow part of the peel off, with lumps of white sugar, and scrape off the surface of the sugar into a preserving pot as fast as it becomes saturated with the oil of the lemon. Press the sugar close, and cover it tight. A little of this sugar imparts a fine flavor to puddings, pies, and cakes. This is the preferable mode of obtaining and preserving the essence of lemon.

Essential Oils. This name is applied to those volatile fluids usually obtained from aromatic plants, by subjecting them to distillation with water. The oil is volatilized with the aqueous vapor, and is easily condensed; a small portion of it is retained in solution by the water, but the greater part separates, and is obtained pure from the difference in their specific gravity. In some instances, as, for example, in the rind of the orange and lemon, the oil exists in distinct vesicles, and may be obtained by expression. The principal volatile or essential oils are those of turpentine, anise-seed, nutmeg, lavender, cloves, caraway, peppermint, spearmint, sassafras, chamomile and citron. The taste of these oils is acrid and burning, and their odor very pungent, generally resembling the taste and smell of the vegetables affording them. They are generally fluid, and remain so even at a low temperature; but some congeal at a very moderate degree of cold, and others are naturally concrete. They are extremely volatile, very soluble in strong alcohol, but do not form soaps with the alkalies, by which they are distinguished from the fixed oils. They are readily inflamed by strong nitric acid, especially with the precaution of adding a little sulphuric acid to render the former more concentrated. Exposed to the action of the air they undergo an alteration in consequence of the absorption of oxygen, become thickened, and gradually change into a solid matter, resembling the true resins. One of the most useful and abundant of the essential oils is that of turpentine, commonly called spirits of turpentine. In general, the volatile oils are used in the practice of medicine, or as perfumes. Those applied to the latter use, as the essence of roses, of jasmine, violet, etc., are possessed of a more feeble odor, and being obtained from the flowers of their respective plants, require much care in their preparation.

Estate, in law, is the title or interest which a person has in lands, tenements, hereditaments or other effects. Estate is real or personal. The phrase "personal estate" is applied not only to movable goods, money, bonds and notes, but also to some fixtures temporarily attached to lands or buildings, and the distinction between those fixtures which are temporarily such and those which belong to and form a part of the house or other real estate, is of importance, as this distinction will determine how it is to be attached on mesne process, or seized and sold, or set off on an execution, and also how it descends on the decease of the proprietor. But personal estate also applies to some interest in lands or houses; thus, a lease of them for a certain number of years. Real estate in lands is of various kinds and descriptions, according to the quantity of interest, its duration, or the time by which it is limited in respect to its commencement or termination, and the number and condition of the owners. A fee simple is the amplest estate which the law admits of. A freehold is an estate for the life of any person or persons. An estate in tail is one limited to certain heirs. An estate in remainder is one of which the owner is to come into possession after the expiration of an intermediate estate of another person, or number of persons or heirs; and so, also, is an estate in reversion; thus, if one grants an estate tail, this estate may expire, in which case the lands will come back or revert to the grantor, and his estate, which still remains to him after he has granted the estate tail, is therefore called a reversion. As to the number of owners, an estate in common is a freehold belonging to more than one proprietor, in individual shares; and so also is an estate in joint-tenancy; but there is this distinction between these two kinds of estates,—that when one joint-tenant dies his share goes to the other joint tenants, which is not the case in tenancies in common. An estate in coparcenary arises when an estate in fee simple descends, on the decease of the owner, to his daughters, sisters, aunts, or female cousins, or their representatives, being females, and they are called coparceners, or, for brevity, parceners. Real estate left to any one by will is called a devise, or an estate by devise, in distinction from a bequest of personal property, which is called a legacy.

Estrays are domestic animals wandering about on the commons, or public roads, or in the fields, whose owners are unknown. Any resident citizen and householder may take up estrays, in nearly all the States, during some portion of the year. When an estray is taken up, write out a particular discription of the animal, then go to the nearest justice of the peace and notify him you have taken up such animal as an estray, and ask him to show you the estray law of your State. The statutes of the several States are so voluminous and unlike that it is impossible to give correct instructions in this book. Remember, however, that estrays can only be taken up at, near or on your own premises. You cannot go out upon the commons or upon the road away from your own farm to take up stock of any kind, and when you do take up estrays, consult the State law.

Etiquette (et-i-ket′), the forms essential to social or official intercourse. Politeness includes etiquette, along with pleasing manners in every little detail of conduct and conversation. Politeness has been defined as "minor morals," and all true politeness is based upon the golden rule, "Do unto others as ye would that they should do unto you." This is the governing motive of good society, influencing all its thoughts, modifying all its speech, and controlling all its actions. True politeness requires that we shall exercise our faculties to secure the approbation, and, if possible, the admiration of all with whom we come in contact. Good manners are habits of mind and body, derived from right thinking and acting; such thinking and acting as shall afford us the greatest happiness, and at the same time preserve the rights and feelings of our neighbor. These habits are acquired by observation and study, and by association with persons of refined taste and elegant culture. For the sake of convenience we shall give the laws and forms of etiquette and the principles of politeness all together under one head, in this place.

In this article we shall endeavor to give such rules of action as will enable the young to enter good society with pleasure to themselves and satisfaction to their friends. The importance of such knowledge should be apparent to every farmer who has sons and daughters ready to be introduced into society. It always affords a pleasure to even the most uncultured parents to have their children appear to advantage among persons of refinement and culture.

A thoroughly good-hearted person, a man or woman of correct principles, will always shape his or her conduct so as to command respect; but it is not sufficient to always act justly or from right principles to fulfill one's duty in society. There are so many observances to be met, so many things to be considered and provided for, that, without an exact knowledge of what is due to one's self and one's associates, it is impossible to fulfill all the requirements of society. This knowledge is obtained by the study of what is termed Etiquette.

Young men and women upon first entering society are made to feel keenly their ignorance of the many forms and customs to which all are expected to conform. No allowance is made for the inexperience of the young persons, and any social blunder or awkwardness is sharply criticised. Even those who are well informed in this respect are sometimes at a loss to know just what to do under certain circumstances. To all such an article embodying the rules recognized by the best society, and stating simply and plainly the exact thing required, and what should be done, must be a welcome assistance. It can be consulted at any time, and will show what the best society, in all parts of the country, regards as good manners. Then what means have young persons who have been reared and educated in the country and are brought into the society of a city, of learning its customs except through this channel, or through dearly bought lessons of experience? Good breeding is the same in the country as in the city, it is true, but social intercourse is so differently conducted that customs and formalities entirely foreign to country life are in vogue. Then there are few young gentlemen and ladies of the country but have occasion to visit the city, or village, either to see relatives or friends, or on business or a tour of sight-seeing. Such should certainly be informed beforehand at least of the more common customs of city life. To neglect to learn and practice the rules prescribed by good society for the regulation of social intercourse, brings with it its own punishment. Those who are rough, coarse and vulgar do not merit the respect of well-bred people, much less than they command any good social influence. It is the duty of every one to gain friends by making the best impression possible, providing it can be done without the sacrifice of principle or honor. Daily experience shows that civility is not only one of the essentials of high success, but that it is almost a fortune of itself, and that he who has this quality in perfection, though a blockhead, is almost sure to get on where, without it, even men of ability fail. "Give a boy address and accomplishments," said an eminent writer, "and you give him the mastery of palaces and fortunes wherever he goes; he has no trouble of earning or owning them; they solicit him to enter and possess." Among strangers a good manner is the best letter of recommendation; for a great deal depends upon first impressions, and these are favorable or unfavorable according to a man's bearing, as he is polite or awkward, shy or self-possessed. While coarseness and gruffness lock doors and close hearts, courtesy, refinement and gentleness are an "open sesame" at which bolts and bars fly back and doors swing open. The rude, boorish man, even though well meaning, is avoided by all. Even virtue itself is offensive when coupled with an offensive manner.

For convenience we will treat the various topics alphabetically, after giving a few remarks as to personal care, both as to appearance and health. In the articles given on the several subjects we do not lay down any arbitrary rules of our own, but simply give the principles and observances that govern in good society, adapted especially to the rural residents.

The first care of all persons in society should be for their personal appearance. The preservation of health and comfort, good taste, and the approbation of friends, require cleanliness of person and dress The habits of neatness and cleanliness should be cultivated. The hands, face, neck and ears should be thoroughly washed every morning in soft water, then briskly rubbed with a crash towel until they are dry and warm. There is nothing that preserves and promotes personal beauty like this. It gives softness and pliancy to the skin and imparts a beautiful glow to the cheeks. Good health and cleanliness also requires that the whole body should be frequently bathed. The garments of an individual may be plain or coarse, or even worn "thin and shiny," but if carefully brushed, neat and worn with dignity, the true lady or gentleman is indicated. The matter of cleanliness extends to all articles of clothing, underwear as well as outer-wear.

The hair and teeth should receive the utmost attention. The skin of the head should be as white as that of the hands, and the hair thoroughly brushed and kept. So, also, with the beard of men. It should be adapted to the style of the face, and carefully attended to, or it will become offensive to its wearer. A man may be as cleanly in all respects at the table with a beard as without one, but not without care and attention. One of nature's most beautiful gifts is fine teeth. The laws of health require that they be kept in good order, and social law demands that they be presented clean, pure and sweet. For information as to the preservation of both hair and teeth, hands, face, feet and eyes, see respective articles in this book.

Boots and shoes should be kept so neat and clean as to show that their owners are not lacking in good taste. One should also be careful not to perfume themselves with tobacco or odors of the hen-house, pig pen or barn.

BALLS. Persons giving balls or dancing parties should be careful not to invite more than their rooms will accommodate, so as to avoid a crush. Invitations to crowded balls are not hospitalities, but inflictions. A hostess is usually safe, however, in inviting one-fourth more than her rooms will hold, as that proportion of regrets are apt to be received. People who do not dance will not, as a rule, expect to be invited to a dancing party.

The Dances. The dances should be arranged beforehand, and for large balls programmes are printed with a list of the dances. Usually a ball opens with a waltz, followed by a quadrille, and these are succeeded by galops, lancers, polkas, quadrilles and waltzes in turn.

General Rules of the Ball Room. In private balls introductions are effected through the lady of the house or members of the family.

No gentleman should ask a lady to dance with him until he has received an introduction.

The usual form of asking a lady to dance is: "May I have the pleasure of dancing this quadrille with you?" Where there is great intimacy, "Will you dance?" may suffice. To accept is easy enough: "Thank you," is sufficient; to decline with delicacy, and without giving offence, is more difficult—"Thank you; I am engaged," suffices when that expresses the fact: when it does not, and a lady would rather not dance with a gentleman applying to her, she must beg to be excused, as politely as possible, and it is in better taste for her not to dance at all in that set.

Ladies should take especial care not to accept two partners for the same dance; nor should a gentleman ask a lady to dance with him more than twice during the same evening; if he is intimate with a lady he may dance with her three, or even four, times. Do not forget to ask the daughters of the house. When a lady has accepted, the gentleman offers her his right arm, and leads her to her place on the floor.

It is not necessary to bow to the lady at the end of a quadrille; in fact, anything like formality is now discountenanced; it is enough that you again offer her your right arm, and walk half round the room with her. You should inquire if she will take refreshments, and if she replies in the affirmative, you will conduct her to the room devoted to that purpose.

The gentleman who dances with a lady in the last dance before supper, conducts that lady to the supper-room, attends on her while there, and escorts her back to the ball-room. At a private ball the lady of the house may ask a gentleman to take a lady down to supper, and he is bound to comply and to treat her with the utmost delicacy and attention.

It is not well to dance every dance, as the exercise is unpleasantly heating and fatiguing. Never forget an engagement: it is an offense that does not admit of excuse, except when a lady commits it; and then a gentleman is bound to take her word without a murmur. It is not the mode for married persons to dance together. Engaged persons should not dance together too often; it is in bad taste. Gentlemen should endeavor to entertain the ladies who dance with them with a little conversation, or something more novel than the weather and the heat of the room; and in round dances they should be particularly careful to guard against collisions, and to see that their dresses are not torn.

Assemblies of this kind should be left quietly. If the party is small, it is permissible to bow to the hostess; but at a large ball this is not necessary, unless, indeed, you meet her on your way from the room. The great thing is to avoid making your departure felt as a suggestion for breaking up the party, as you have no right to hint by your movements that you consider the entertainment has been kept up long enough.

Finally, let no gentleman presume on a ball-room introduction. It is given with a view to one dance only, and will certainly not warrant a gentleman in going farther than asking a lady to dance a second time. Out of the ball-room reach, an introduction has no force whatever.

DRESS. To dress well requires good taste, good sense and refinement. A woman of good sense will neither make dress her first nor her last object in life. No sensible wife will betray that total indifference for her husband which is implied in the neglect of her appearance, and she will remember that to dress consistently and tastefully is one of the duties which she owes to society. Every lady, however insignificant her social position may appear to herself, must exercise a certain influence on the feelings and opinions of others. An attention to dress is useful as retaining, in the minds of sensible men, that pride in a wife's appearance which is so agreeable to her, as well as that due influence which cannot be obtained without it. But a love of dress has its perils for weak minds. Uncontrolled by good sense and stimulated by personal vanity, it becomes a temptation at first, and then a curse. When it is indulged in to the detriment of better employments, and beyond the compass of means it cannot be too severely condemned.

Consistency in regard to station and fortune is the first matter to be considered. A woman of good sense will not wish to expend in unnecessary extravagances money wrung from an anxious, laborious husband; or, if her husband be a man of fortune, she will not, even then, encroach upon her allowance. In the early years of married life, when the income is moderate, it should be the pride of a woman to see how little she can spend upon her dress, and yet present that tasteful and creditable appearance which is desirable. Much depends upon management, and upon the care taken of garments. She should turn everything to account, and be careful of her clothing when wearing it.

Gloves. Gloves are worn by gentlemen as well as ladies in the street, at an evening party, at the opera or theater, at receptions, at church, when paying a call, riding or driving; but not in the country or at dinner. White should be worn at balls; the palest colors at evening parties and neutral shades at church.

Evening Dress for Gentlemen. The evening or full dress for gentlemen is a black dress suit—a "swallow-tail" coat, the vest cut low, the cravat white, and kid gloves of the palest hue or white. The shirt front should be white and plain; the studs and cuff-buttons simple. Especial attention should be given to the hair, which should be neither short nor long. It is better to err upon the too-short side, as too long hair savors of affectation, destroys the shape of the physiognomy, and has a touch of vulgarity about it. Evening dress is the same for a large dinner party, a ball or an opera. In some circles, however, evening dress is considered an affectation, and it is as well to do as others do.

Morning Dress for Gentlemen. The morning is a black frock-coat, or a black cut-away, white or black vest, according to the season, gray or colored pants, plaid or stripes, according to the fashion, a high silk (stove-pipe) hat, and a black scarf or necktie. A black coat with black pants is not considered a good combination, nor is a dress coat and colored or light pants. The morning dress is suitable for garden parties, Sundays, social teas, informal calls, morning calls and receptions.

Jewelry for Gentlemen. It is not considered in good taste for men to wear much jewelry. They may with propriety wear one gold ring, studs and cuff-buttons, and a watch chain, not too massive, with a modest pendant, or none at all. Anything more looks like a superabundance of ornament, and even affectation.

Evening Dress for Ladies. Evening dress for ladies may be as rich, elegant and gay as one chooses to make it. It is everywhere the custom to wear full evening dress in brilliant evening assemblages. It may be cut either high or low at the neck, yet no lady should wear her dress so low as to make it quite noticeable or a special subject of remark. Evening dress is what is commonly known as "full dress," and will serve for a large evening party, ball or dinner. No directions will be laid down with reference to it, as fashion devises how it to is be made and what material should be used.

Ball Dress. Ball dressing requires less art than the nice gradations of costume in the dinner dress, and the dress for evening parties. For a ball, everything should be light and diaphanous, somewhat fanciful and airy. The heavy, richly-trimmed silk is only appropriate to those who do not dance. The richest velvets, the brightest and most delicate tints in silk, the most expensive laces, elaborate coiffures, a large display of diamonds, artifical flowers of the head-dress and natural flowers for hand bouquets, all belong, more or less, to the costume for a large ball.

The Full Dinner Dress. The full dinner dress for guests admits of considerable splendor. It may be of any thick texture of silk or velvet for winter, or light rich goods for summer, and should be long and sweeping. Every trifle in a lady's costume should be, as far as she can afford it, faultless. The fan should be perfect in its way, and the gloves should be quite fresh. Diamonds are used in broaches, pendants, ear-rings and bracelets. If artificial flowers are worn in the hair, they should be of the choicest description. All the light neutral tints, and black, dark blue, purple, dark green, garnet, brown and fawn are suited for dinner wear.

Dress of Hostess at a Dinner Party. The dress of a hostess at a dinner party should be rich in material, but subdued in tone, so as not to eclipse any of her guests. A young hostess should wear a dress of rich silk, black or dark in color, with collar and cuffs of fine lace; and if the dinner be by daylight, plain jewelry, but by gaslight, diamonds.

Ordinary Evening Dress. The ordinary evening house dress should be tasteful and becoming, with a certain amount of ornament, and worn with jewels. Silks are the most appropriate for this dress, but all the heavy woolen dress fabrics for winter, and the lighter lawns and organdies for summer, elegantly made, are suitable. For winter, the colors should be rich and warm, and knots of bright ribbon of a becoming color should be worn at the throat and in the hair. The latter should be plainly dressed. Artificial flowers and diamonds are out of place. This is both a suitable dress in which to receive or make a casual evening call. If a hood is worn, it must be removed during the call. Otherwise a full dress bonnet must be worn.

Traveling Dress. Comfort and protection from dust and dirt are the requirements of a traveling dress.

When a lady is about making an extensive journey, a traveling suit is a great convenience; but for a short journey, a large linen overdress or duster may be put on over the ordinary dress in summer, and in winter a waterproof cloak may be used in the same way. For traveling costumes a variety of materials may be used, of soft, neutral tints, and smooth surface which does not retain the dust. These should be made up plainly and quite short. The underskirts should be colored, woolen in winter and linen in summer. The hat or bonnet must be plainly trimmed and completely protected by a large veil. Velvet is unfit for a traveling hat, as it catches and retains the dust; collars and cuffs of plain linen. The hair should be put up in the plainest manner. A waterproof and warm woolen shawl are indispensable and may be rolled in a shawl strap when not needed. A satchel should be carried, in which may be kept a change of collars, cuffs, gloves, handkerchiefs, toilet articles, and towels. A traveling dress should be well supplied with pockets, the waterproofs should have large pockets, and there should be one in the underskirt in which to carry such money and valuables as are not needed for immediate use.

Mourning. The people of the United States have settled upon no prescribed periods for the wearing of mourning garments. Some wear them long after their hearts have ceased to mourn. Where there is profound grief, no rules are needed, but where the sorrow is not so great, there is need of observance of fixed periods for wearing mourning.

Deep mourning requires the heaviest black of serge, bombazine, lusterless alpaca, delaine, merino or similar heavy clinging material, with collar and cuffs of crape. Mourning garments should have little or no trimming; no flounces, ruffles or bows are allowable.

The bonnet is of black crape; a hat is inadmissible. The veil is of crape or barege with heavy border; black gloves and black-bordered handkerchief. In winter dark furs may be worn with the deepest mourning. Jewelry is strictly forbidden, and all pins, buckles, etc., must be of jet. Lusterless alpaca and black silk trimmed with crape may be worn in second mourning, with white collars and cuffs. The crape veil is laid aside for net or tulle, but the jet jewelry is still retained. A still less degree of mourning is indicated by black and white, purple and gray, or a combination of these colors. Crape is still retained in bonnet trimming, and crape flowers may be added. Light gray, white and black, and light shades of lilac, indicate a slight mourning. Black lace bonnet, with white or violet flowers, supersedes crape, and jet and gold jewelry is worn.

The deepest mourning is that worn by a widow for her husband. They wear deep mourning for one year, then ordinary mourning for one year. For parents, from one to two years. For brothers and sisters that have reached maturity, one year.

Harmony of Colors. A lady must always consider what colors will suit her complexion. If she be dark, blue will not look well upon her; or if she be fair, pink will not become her. The most trying color is yellow. Only very prominent brunettes can wear it.

Red and blue, red and yellow, blue and yellow, and scarlet and crimson may never be united in the same costume. If the dress be red, green may be introduced in a minute quantity; if blue, orange; if green, crimson. Scarlet and Solferino are deadly enemies, each killing the other whenever they meet.

Two contrasting colors, such as red and green, may not be used in equal quantities in the dress, as they are both so positive in tone that they divide and distract the attention. When two colors are worn in any quantity, one must approach a neutral tint, such as gray or drab. Black may be worn with any color, though it looks best with the lighter shades of the different colors. White may also be worn with any color, though it looks best with the darker tones. Thus, white and crimson, black and pink, each contrast better and have a richer effect than though the black were united with the crimson and the white with the pink. Drab, being a shade of no color between black and white, may be worn with equal effect with all.

A person of very fair, delicate complexion should always wear the most delicate of tints, such as light blue, mauve, and pea-green. A brunette requires bright colors, such as scarlet and orange, to bring out the brilliant tints in her complexion. A florid face and auburn hair call for blue.

Black hair has its color and depth enhanced by scarlet, orange, or white, and will bear diamonds, pearls, or lusterless gold.

Dark-brown hair will bear light blue or dark blue in a lesser quantity.

If the hair has no richness of coloring, a pale yellowish green will by reflection produce the lacking warm tint.

Light-brown hair requires blue, which sets off to advantage the golden tint.

Pure golden or yellow hair needs blue, and its beauty is also increased by the addition of pearls or white flowers.

Auburn hair, if verging on the red, needs scarlet to tone it down. If a golden red, blue, green, purple, or black will bring out the richness of its tints.

Flaxen hair requires blue.

SIZE IN RELATION TO DRESS AND COLORS. A small person may dress in light colors which would be simply ridiculous on a person of larger proportions. So a lady of majestic appearance should never wear white, but will be seen to the best advantage in black or dark tints. A lady of diminutive stature is dressed in bad taste when she appears in a garment with large figures, plaids, or stripes. Neither should a lady of large proportions be seen in similar garments, because, united with her size, they give her a "loud" appearance. Indeed, pronounced figures and broad stripes and plaids are never in perfect taste.

Heavy, rich materials suit a tall figure, while light, full draperies should only be worn by those of slender proportions and not too short. Short people must be content with meager drapery and quiet colors.

Tall and slim persons should avoid stripes; short, chunky ones flounces, or any horizontal trimming of the dress which, by breaking the outline from the waist to the feet, produces an effect of shortening.

CALLS. There are calls of various kinds to be made by people of good breeding, and as the young lady who has been reared in her quiet country home emerges into womanhood, and enters society, she should know something of the etiquette of calling and receiving calls. She should be able to entertain in the best manner those who visit or call at her rural home, or present herself properly to her friends, acquaintances or strangers, in the neighborhood. Often, too, she may visit a relative or friend in the village or city where she will receive callers. Likewise the young man may have occasion to call in the city, or upon lady friends in his vicinity, and should be posted as to the proper manner to make the calls and conduct himself. Thus it is the object of this article to give such information as will enable persons to familiarize themselves with the rules governing calls. We do not forget the matron, but incorporate such information as is adapted to her.

Calls upon Strangers. When strangers enter a community, either to make a visit or secure a home, those who desire to make their acquaintance shall manifest their disposition to be sociable by giving them the first call. When a call is thus made upon a stranger he or she should be politely invited to return the compliment, which should be done at the earliest convenience. When calls are not returned it is understood that even a formal sociability is not considered agreeable.

Formal Calls. It frequently happens that persons have a long list of acquaintances, with whom, on account of pressure of domestic cares, or other important business which demands the greater part of their time, they cannot be on terms of intimacy, and yet who desire to cultivate their friendship by the exercise of at least a formal sociability. In order to accommodate this social necessity for recognition it is the custom to make brief visits or calls. As the call is necessarily short it is not expected that ladies shall remove their bonnets or shawls.

The lady of the house rises on the entrance of her visitors, who at once advance to pay their respects to her before speaking to others. If too many callers are present to enable her to take the lead in conversation, she pays special attention to the latest arrivals, watching to see that no one is left alone, and talking to each of her guests in succession, or seeing that some one is doing so.

A lady who is not in her own house does not rise, either on the arrival or departure of ladies, unless there is some great difference of age. Attention to the aged is one of the marks of good breeding which is never neglected by the thoughtful and refined.

When introductions are given, it is the gentleman who should be presented to the lady; when two ladies are introduced it is the younger who is presented to the older.

A lady receiving gives her hand to a stranger as to a friend, when she wishes to bestow some mark of cordiality in welcoming a guest to her home, but a gentleman should not take the initiatory in handshaking. It is the lady's privilege to give or withhold as she chooses.

A gentleman rises, when those ladies with whom he is talking rise to take their leave. He also rises upon the entrance of ladies, but he does not offer seats to those entering, unless in his own house, or unless requested to do so by the hostess, and then he does not offer his own chair if others are available.

A call should not be less than 15 minutes in duration, nor should it be so long as to become tedious. A bore is a person who does not know when you have had enough of his or her company, and gives more of it than is desirable. Choose a time to leave when there is a lull in the conversation, and the hostess is not occupied with fresh arrivals. Then take leave of your hostess, bowing to those you know as you leave the room, not to each in turn, but let one bow include all.

If, on making a call, you are introduced into a room where you are unknown to those assembled, at once give your name and mention upon whom your call is made.

In meeting a lady or gentleman whose name you cannot recall, frankly say so if you find it necessary. Sensible persons will prefer to recall themselves to your memory rather than to feel that you are talking to them without fully recognizing them. To affect not to remember a person is despicable, and reflects only on the pretender.

Gentlemen as well as ladies, when making formal calls, send in but one card, no matter how many members of the family they may wish to see. If a guest is stopping at the house, the same rule is observed. If not at home, one card is left for the lady, and one for the guest. The card for the lady may be folded so as to include the family.

General Rules Regarding Calls. A gentleman in making a formal call should retain his hat and gloves in his hand on entering the room. The hat should not be laid upon a table or stand, but kept in the hand, unless it is found necessary from some cause to set it down. In that case, place it upon the floor. An umbrella should be left in the hall. In an informal evening call, the hat, gloves, overcoat, and cane may be left in the hall.

A lady, in making a call, may bring a stranger, even a gentleman, with her, without previous permission. A gentleman, however, should never take the same liberty.

No one should prolong a call if the person upon whom the call is made is found dressed ready to go out.

A lady should be more richly dressed when calling on her friends than for an ordinary walk.

A lady should never call upon a gentleman except upon some business, officially or professionally.

Never allow your children, dogs or pets of any sort to accompany you in a call. They often prove disagreeable and troublesome.

Two persons out of one family, or at most three, are all that should call together.

It is not customary in cities to offer refreshments to callers. In the country, where the caller has come from some distance, it is exceedingly hospitable to do so.

Calls in the country may be less ceremonious and of longer duration than those made in the city.

A person making a call should not, while waiting for a hostess, touch an open piano, walk about the room examining pictures, nor handle any ornament in the room.

Never offer to go to the room of an invalid upon whom you have called, but wait for an invitation to do so.

In receiving morning calls, it is unnecessary for a lady to lay aside any employment, not of an absorbing nature, upon which she may happen to be engaged. Embroidery, crocheting or light needle-work are perfectly in harmony with the requirements of the hour, and the lady looks much better employed than in absolute idleness.

A lady should pay equal attention to all her guests. The display of unusual deference is alone allowable, when distinguished rank or reputation or advanced age justifies it.

A guest should take a seat indicated by the hostess. A gentleman should never seat himself on a sofa beside her, nor in a chair in immediate proximity, unless she specially invites him to do so.

A lady need not lay aside her bonnet during a formal call, even though urged to do so. If the call be a friendly and unceremonious one, she may do so if she thinks proper, but not without an invitation.

A gentleman caller must not look at his watch during a call, unless, in doing so, he pleads some engagement and asks to be excused.

In calling upon a person living at a hotel or boarding-house, it is customary to stop in the parlor and send your card to the room of the person called upon.

When a person has once risen to take leave, he should not be persuaded to prolong his stay.

Visits of friendship are conducted by no particular rules of etiquette, as it is presumed that intimate friends or relatives understand each other's tastes and peculiarities, and will conduct themselves in a manner mutually agreeable.

A sick person sometimes desires visits or calls from acquaintances, and sometimes not; and it is absolutely necessary that a friend or neighbor should ascertain, from the responsible attendant, the desires of the sick in this respect, as well as the orders of the physician, before incurring the risk of intrusion. Do not be too officious. Be willing to serve, but not to consume time in wearying the patient with long calls, visits or anything else that might be tedious. Nor is it proper to insist on remedies and prescriptions of your own.

On hearing of the death of a friend, or in the family of a friend, it is well to make a short call of condolence, ascertaining first, of some responsible person in charge of affairs, whether such call might be agreeable. Calls of condolence are often proper, made in the parlor in the presence of the person in charge, even if the bereft party does not personally appear.

CARDS. A card used in calling should have nothing upon it but the name of the caller. A lady's card should not bear her place of residence. A physician may put the prefix "Dr.," or the affix "M. D.," upon his card, and an army or navy officer his rank and branch of service.

Wedding Cards. Wedding cards are only sent to those people whom the newly married couple desire to keep among their acquaintances, and it is then the duty of those receiving the cards to call first on the young couple.

Size and Style of Visiting or Calling Cards. A medium-sized is in better taste than a very large card, for married persons. Cards bearing the name of the husband alone are smaller. The cards of unmarried men should also be small. The engraving in simple writing is preferred, and without flourishes. Nothing in cards can be more common-place than large printed letters, be the type what it may. Young men should dispense with the "Mr." before their names. Tinted or colored cards are not in good taste.

Card for Mother and Daughter. The name of young ladies are sometimes printed or engraved on their mother's cards; both in script. It is, of course, allowable for the daughter to have cards of her own.

Calling at Hotels. In calling upon a person living or stopping temporarily at a hotel, wait in the parlor and send up your card. Even intimate friends should observe this rule. Gentlemen may wait in office or hall of the hotel while the waiter takes up their card.

CONVERSATION. It is not given to every man to be a brilliant talker. There is no reason, however, why any person who goes into society should be ignorant of the rules of polite intercourse. To be able to converse well is an attainment which should be cultivated by every intelligent man and woman. It is better to be a good talker than a good singer or musician, because the former is more widely appreciated, and the company of a person who is able to talk well on a great variety of subjects, is much sought after. The importance, therefore, of cultivating the art of conversation cannot easily be over-estimated. It should be the aim of all intelligent persons to acquire the habit of talking sensibly and with facility upon all topics of general interest to society, so that they may both interest others and be themselves interested, in whatever company they may chance to be thrown.

The training for this should be commenced in early childhood. Parents should not only encourage their children to express themselves freely upon everything that attracts their attention and interests them, but they should also incite their faculties of preception, memory and close observation, by requiring them to recount everything, even to its minutest details, that they may have observed in walking to and from school, or in taking a ride in a carriage or in the cars.

By training a child to a close observation of everything he meets or passes, his mind becomes very active, and the habit having once been acquired, he becomes interested in a great variety of objects; sees more and enjoys more than one who has not been so trained.

Topics. It is almost useless to say that your conversation should be adapted to your company, but this is the golden rule on this subject. Some men make a point of talking common-place to all ladies alike, as if a woman could only be a trifler. Others, on the contrary, seem to forget in what respect the education of a lady differs from that of a gentleman, and commit the opposite error of conversing on topics with which ladies are seldom acquainted, and in which few or any are seldom interested. Religion, politics and all disputed points whereon party lines are strongly drawn, are topics that should never be introduced into general conversation, for they are subjects dangerous to harmony. Persons are most likely to differ, and least likely to preserve their tempers on these topics. Long arguments in general company, however entertaining to the disputants, are very tiresome to the hearers.

Gossip, or tattling, is the telling of unfounded suspicions or unreliable stories about a neighbor. This is probably the most difficult vice to avoid.

Talk of yourself and your own affairs as little as possible. If you wish to be an agreeable listener, show an interest in the affairs of others as related by them.

Correct Use of Words. The correct use of words is indispensable to a good talker who would escape the unfavorable criticism of an educated listener. There are many words and phrases used in some cases by persons who have known better, but who have become careless from association with others who make constant use of them. "Because that" and "but that" should never be used in connection, the word "that" being entirely superfluous. The word "avocation" is often used for "vocation." "Unhealthy" food is spoken of when it should be "unwholesome, or unhealthful." "Had not ought to" is sometimes heard for "ought not to;" "banister" for "baluster;" "handsful" and "spoonsful" for "handfuls" and "spoonfuls;" "it was him" for "it was he;" "it was me" for "it was I;" "whom do you think was there?" for "who do you think was there?" "a mutual friend" for "a common friend;" "like I did" instead of "as I did;" "those sorts of things" instead of "that sort of thing;" "laying down" for "lying down;" "setting on a chair" for "sitting on a chair;" "try and make him" instead of "try to make him;" "she looked charmingly" for "she looked charming;" "loan" for "lend;" "to get along" instead of "to get on;" "cupalo" instead of "cupola;" "who" for "whom"—as, "who did you see?" for "whom did you see?" double negatives, as, "he didn't want no money;" "lesser" for "least;" "off-set" instead of "set-off," and many other words which are often carelessly used by those who have been better taught as well as those who are ignorant of their proper use.

Profanity. No gentleman uses profane language. It is unnecessary to add that no gentleman will use profane language in the presence of a lady. For profanity there is no excuse. It is a low and paltry habit, acquired from association with low and paltry spirits, who possess no sense of honor, no regard for decency, and no reverence or respect for beings of a higher moral or religious nature than themselves. The man who habitually uses profane language lowers his moral tone with every oath he utters. Moreover, the silliness of the practice, if no other reason, should prevent its use by every man of good sense.

Profanity never did any one the slightest good. No one is richer, wiser, happier, or more esteemed for it. It helps no man's education or manner; it commends no one to good society; it is disgusting to man and insulting to God.

Expletives. It exhibits a want of culture to interlard your sentences with hackneyed phrases of emphasis, as, "sure as death," "quick as lightning," "most horrid sight I ever saw," "Jerusalem!" "by hoky," "upon my honor," "you may bet your bottom dollar," "plague take it," "you bet," etc.

Attention. Polite people always look the person to whom their conversation is addressed in the face, and he, to appear respectful, must look directly at the speaker.

Things to be Avoided. It must be remembered that a social gathering should never be made the arena of a dispute. Consequently every subject liable to provoke a discussion should be avoided. Even slight inaccuracy in statement of facts or opinions should rarely be remarked on in conversation.

Do not permit yourself to lose your temper in society, or show that you have taken offense at a supposed slight.

If any one should assume a disagreeable tone of voice or offensive manner toward you, never return it in company, and above all, do not adopt the same style of conversation with him. Appear not to notice it, and generally it will be discontinued, as it will be seen that it has failed in its object.

Avoid all coarseness and undue familiarity in addressing others. A person who makes himself offensively familiar will have few friends.

Never attack the character of others in their absence; and if you hear others attacked, say what you can consistently to defend them.

Do not ask the price of articles you observe, except from intimate friends, and then very quietly, and only for some good reason.

Do not appear to notice an error in language, either in pronunciation or grammar, made by the person with whom you are conversing, and do not repeat correctly the same word or phrase. This would be as ill-bred as to correct it when spoken.

Mimicry is ill-bred and must be avoided.

Sneering at the private affairs of others has long ago been banished from the conversation of well-mannered people.

Never introduce unpleasant topics, nor describe revolting scenes or incidents in general company.

Never give officious advice. Even when sought for, give advice sparingly.

Never, directly or indirectly, refer to the affairs of others, which it may give them pain in any degree to recall.

Do not intrude upon those who appear to be engaged in any conversation which they may be unwilling for you to hear.

Do not interrupt a person in speaking, without his consent or asking his pardon.

Never hold your companion in conversation by the button-hole. If you are obliged to detain him forcibly in order to say what you wish, you are pressing upon him what is disagreeable or unwelcome, and you commit a gross breach of etiquette in so doing.

Especially avoid contradictions, interruptions and monopolizing all conversation yourself. These faults are all intolerable and very offensive.

To speak to one person in a company in ambiguous terms, understood by him alone, is as rude as if you had whispered in his ear.

Avoid stale and trite remarks on common-place subjects; also all egotism and anecdotes of personal adventure and exploit, unless it should be called out by persons you are conversing with.

To make a classical quotation in a mixed company is considered pedantic and out of place, as is also an ostentatious display of your learning.

Long arguments or heated discussions are apt to be tiresome to others, and should be avoided.

It is considered extremely ill-bred for two persons to whisper in society, or to converse in a language with which all persons are not familiar.

Avoid talking too much, and do not inflict upon your hearers interminably long stories, in which they can have but little interest.

Courtship and Marriage. The correct behavior of a young man toward young ladies, and of young ladies toward young men, during that portion of their lives when they are respectfully paying attention to and receiving attention from, one another, is a matter which requires no little consideration.

A Gentleman's Conduct Toward Ladies. Young people of either sex, who have arrived at mature age, and who are not engaged, have the utmost freedom in their social intercourse in this country, and are at liberty to associate and mingle freely in the same circles with those of the opposite sex. As soon, however, as a young gentleman neglects all others, to devote himself to a single lady, he gives that lady reason to suppose that he is particularly attracted to her, and may give her cause to believe that she is to become engaged to him, without telling her so. A gentleman who does not contemplate matrimony should not pay too exclusive attention to any one lady.

Ladies' Conduct Toward Gentlemen. A young lady who is not engaged may receive calls and attentions from such unmarried gentlemen as she desires. She should use due discretion, however, as to whom she favors by the acceptance of such invitations. A young lady should not allow special attention from any one to whom she is not specially attracted, because, first, she may do injury to the gentleman in seeming to give his suit encouragement; and, secondly, she may keep away from her those whom she likes better, but who will not approach her under the mistaken idea that her feelings are already interested. A young lady should not encourage the address of a gentleman unless she sees that she can return his affections. It is the prerogative of a man to propose, and of the woman to accept or refuse, and a lady of tact and kind heart will exercise her prerogative before her suitor is brought to the humiliation of an offer which must result in a refusal.

No well-bred lady will too eagerly receive the attentions of a gentleman, no matter how much she admires him; nor, on the other hand, will she be so reserved as to altogether discourage him. A man may show considerable attention to a lady without becoming a lover; and so a lady may let it be seen that she is not disagreeable to him without discouraging him. She will be able to judge soon from his actions and deportment, as to his motive in paying her his attentions, and will treat him accordingly. A man does not like to be refused when he makes a proposal, and no man of tact will risk a refusal. Neither will a well-bred lady encourage a man to make a proposal which she must refuse. She should endeavor, in discouraging him as a lover, to retain his friendship. A young man of sensibilities, who can take a hint when it is offered him, need not run the risk of a refusal.

Premature Declarations. It is very injudicious, not to say presumptuous, for a gentleman to make a proposal to a young lady on too brief an acquaintance. A lady who would accept a gentleman at first sight can hardly possess the discretion needed to make a good wife.

Perhaps there is such a thing as love at first sight, but love alone is a very uncertain foundation upon which to base marriage. There should be thorough acquaintanceship and a certain knowledge of harmony of tastes and temperaments before matrimony is ventured upon.

An Acceptable Suitor. Parents should always be able to tell from observation and instinct just how matters stand with their daughter; and if the suitor is an acceptable one and everything satisfactory, then the most scrupulous rules of etiquette will not prevent their letting the young couple alone. If the lover chooses to propose directly to the lady and consult her father afterward, consider that he has a perfect right to do so. If her parents have sanctioned his visits and attentions by a silent consent, he has a right to believe that his addresses will be favorably received by them.

Requirements for a Happy Marriage. Respect for each other is as necessary to a happy marriage as that the husband and wife should have an affection for one another. Social equality, intellectual sympathy, and sufficient means are very important matters to be considered by those who contemplete matrimony.

It must be remembered that husband and wife, after marriage, have social relations to sustain, and perhaps it will be discovered, before many months of wedded life have passed, when there is a social inequality, that one of the two have made sacrifice for which no adequate compensation has been or ever will be received. And so both lives become soured and spoiled, because neither receives nor can receive the sympathy which their efforts deserve, and because their cares are multiplied from a want of congeniality. One or the other may find that the noble qualities seen by the impulse of early love were but the creation of an infatuated fancy, existing only in the mind where it originated.

Another condition of domestic happiness is intellectual sympathy. Man requires a woman who can make his home a place of rest for him, and woman requires a man of domestic tastes. While a woman who seeks to find happiness in a married life will never consent to be wedded to an idler or a pleasure-seeker, so a man of intelligence will wed none but a woman of intelligence and good sense. Neither beauty, physical characteristics nor other external qualifications will compensate for the absence of intelligent thought, and clear and quick comprehensions. An absurd idea is held by some that intelligence and domestic virtues cannot go together, that an intellectual woman will never be content to stay at home to look after the interests of her household and children. A more unreasonable idea has never been suggested; for, as the intellect is strengthened and cultured, it has a greater capacity of affection, of domesticity, and of self-sacrifice for others.

Mutual trust and confidence are other requisites for happiness in married life. There can be no true love without trust. The responsibility of a man's life is in a woman's keeping from the moment he puts his heart into her hands. Without mutual trust there can be no real happiness.

Another requisite for conjugal happiness is moral and religious sympathy, that each may walk side by side in the same path of moral purpose and social usefulness, with joint hope of immortality.

Proposals of Marriage. Rules in regard to proposals of marriage cannot be laid down, for they are and should be as different as people. The best way is to apply to the lady in person, and receive the answer from her own lips. If courage should fail a a man in this, he can resort to writing, by which he can clearly and boldly express his feelings. A spoken declaration should be bold, manly, and earnest, and so plain in its meaning that there can be no misunderstanding. As to the exact words to be used, there can be no set formula: each proposer must be governed by his own ideas and sense of propriety in the matter.

A gentleman should evince a sincere and unselfish affection for his beloved, and he will show as well as feel that her happiness must be considered before his own. Consequently, he should not press an unwelcome suit upon a young lady. If she has no affection for him, and does not conceive it possible ever to entertain any, it is cruel to urge her to give her person without her love. The eager lover may believe, for the time being, that such possession would satisfy him; but the day will surely come when he will reproach his wife that she had no love for him, and he will possibly make that an excuse for all manner of unkindness.

A Lady's First Refusal. It is not always necessary to take a lady's first refusal as absolute. Diffidence or uncertainty as to her own feelings may sometimes influence a lady to reply in the negative, and after consideration cause her to regret that reply.

Though a gentleman may repeat his suit with propriety after having been once repulsed, still it should not be repeated too often or too long, lest it should degenerate into importuning.

No lady worthy any gentleman's regard will say "No" twice to a suit which she intends ultimately to receive with favor. A lady should be allowed all the time she requires before making up her mind; and if the gentleman grows impatient at the delay, he is always at liberty to insist on an immediate answer and abide by the consequences of his impatience.

Nothing can be more unfair or more unjustifiable than a doubtful answer given under the plea of sparing the suitor's feelings. It raises false hopes. It renders a man restless and unsettled. It may cause him to express himself or to shape his conduct in such a manner as he would not dream of doing were his suit utterly hopeless.

How to Treat a Refusal. As a woman is not bound to accept the first offer that is made to her, so no sensible man will think the worse of her, nor feel himself personally injured, by a refusal. That it will give him pain is most probable. A scornful "No" or a simpering promise to "think about it" is the reverse of generous.

In refusing, the lady ought to convey her full sense of the high honor intended her by the gentleman, and to add, seriously but not offensively, that it is not in accordance with her inclination, or that circumstances compel her to give an unfavorable answer.

It is only the contemptible flirt that keeps an honorable man in suspense for the purpose of glorifying herself by his attentions in the eyes of friends. Nor would any but a frivolous or vicious girl boast of the offer she had received and rejected. Such an offer is a privileged communication. The secret of it should be held sacred. No true lady will ever divulge to anyone, unless it may be to her mother, the fact of such an offer. It is the severest breach of honor to do so. A lady who has once been guilty of boasting of an offer should never have a second opportunity for thus boasting.

No true-hearted woman can entertain any other feeling than that of commiseration for the man over whose happiness she has been compelled to throw a cloud, while the idea of triumphing in his distress, or abusing his confidence, must be inexpressibly painful to her.

Presents. When a couple become engaged, the gentleman presents the lady with a ring, which is worn on the ring-finger of the right hand. He may also make her other small presents from time to time, until they are married; but if she has any scruples about accepting them, he can send her flowers, which are at all times acceptable.

An Engaged Woman. An engaged woman should eschew all flirtations, though it does not follow that she is to cut herself off from all association with the other sex because she has chosen her future husband. She may still have friends and acquaintances, she may still receive visits and calls, but she must try to conduct herself in such a manner as to give no offense.

An Engaged Man. The same rules may be laid down in regard to the other party to the contract, only that he pays visits instead of receiving them. Neither should assume a masterful or jealous attitude toward each other. They are neither of them to be shut up away from the rest of the world, but must mingle in society after marriage nearly the same as before, and take the same delight in friendship. The fact that they have confessed their love to each other ought to be deemed a sufficient guarantee of faithfulness; for the rest let there be trust and confidence.

The conduct of a gentleman who is engaged should be tender, assiduous and unobtrusive. He will be kind and polite to the sisters of his betrothed and friendly with her brothers. Yet he must not be in any way unduly familiar or force himself into family confidences on the ground that he is to be regarded as a member of the family. Let the advance come rather from them to him, and let him show a due appreciation of any confidences which they may be pleased to bestow upon him. The family of the young man should make the first advances toward an acquaintance with his future wife. They should call upon her or write to her, and they may with perfect propriety invite her to visit them in order that they may become acquainted.

INTRODUCTION. The initiatory step to the formation of an acquaintanceship or friendship is usually by introduction, though it is by no means uncommon that when it has taken place without an introduction, it is not of the best and purest, and results to the advantage of both.

We briefly give the rules governing introduction that will apply equally to the country or city. One of the fundamental principles is the care and discrimination that should be exercised in making introductions, especially of gentlemen to ladies. It is to be remembered that an introduction is regarded as a social indorsement of the person introduced, and that under certain circumstances it would be wrong to introduce to our friends casual acquaintances of whom we know nothing, who may prove to be anything but desirable persons to know. By introducing a man of bad character to a lady you do her a positive wrong. She cannot shake him off as easily as a man can, and his association with her is an injury to her reputation.

How to Introduce. The proper form of introduction is to present the gentleman to the lady, the younger to the elder, the inferior in social standing to the superior. In introducing, you bow to the lady and say, "Miss R., allow me to introduce to you Mr. D. Mr. D., Miss R." It is the duty of Mr. D. upon bowing to say, "It gives me great pleasure to form your acquaintance, Miss R.," or a remark of this nature.

If gentlemen are to be introduced to one another, the form is, "Col. Blank, permit me to introduce to you Mr. Cole. Mr. Cole, Col. Blank." The exact words of an introduction are immaterial, so long as a proper form and order is preserved.

The word "present" is often used in place of "introduce." While it is customary to repeat the names of the two parties introduced at the close of the introduction, it is often omitted as a useless formality. It is of the utmost importance that each name should be spoken distinctly. If either of the parties does not distinctly hear the name of the other he should say at once, without hesitation or embarrassment, before making the bow, "I beg your pardon; I did not catch (or understand) the name," when it may be repeated to him.

If several persons are to be introduced to one individual, mention the name of the single individual first, and then call the others in succession, bowing slightly as each name is pronounced.

Introducing Relatives. In introducing members of your own family, be careful not only to specify the degree of relationship, but to give the name also. It is awkward to a stranger to be introduced to "My brother Tom," or "My sister Carrie." When either the introducer or the introduced is a married lady, the name of the party introduced can only be guessed at.

Bestowing of Titles. In introducing a person give him his appropriate title. If he is a clergyman, say "The Rev. Mr. Clark " If a doctor of divinity, say "The Rev. Dr. Clark." If he is a member of Congress, call him "Honorable," and specify to which branch of Congress he belongs.

Whom to Introduce. A gentleman should not be introduced to a lady unless her permission has been previously obtained, and no one should ever be introduced into the house of a friend except permission is first granted. As a rule, gentlemen should not be introduced to each other until their wishes on the subject are ascertained.

A friend visiting at your house must be introduced to all callers, and courtesy requires the latter to cultivate the acquaintance while your visitor remains with you. If you are the caller introduced, you must show the same attention to the friend of your friend that you wish shown your own friends under the same circumstances. Persons meeting at a public place need not introduce each other to the strangers who may chance to be with them; and, even if the introduction does take place, the acquaintance need not be continued unless desired.

The Salutation. A slight bow is all that is required by courtesy, after an introduction. Shaking hands is optional, and it should rest with the older, or the superior in social standing, to make the advances. It is often an act of kindness on their part, and as such to be commended. It is a common practice among gentlemen, when introduced to one another, to shake hands, and, as it evinces more cordiality than a mere bow, is generally to be preferred. An unmarried lady should not shake hands with gentlemen indiscriminately.

Recognition. It is the privilege of the lady to determine whether she will recognize a gentleman after an introduction, and he is bound to return the bow. In bowing to a lady on the street, it is not enough that a gentleman should touch his hat: he should lift it from his head.

The "Cut Direct." The "cut direct," which is given by a prolonged stare at a person, if justified at all, can only be in case of extraordinary and notoriously bad conduct on the part of the individual "cut," and is very seldom called for. If any one wishes to avoid a bowing acquaintance with another, it can be done by looking aside or dropping the eyes. It is an invariable rule of good society that a gentleman cannot "cut" a lady under any circumstances, but circumstances may arise when he may be excused for persisting in not meeting her eyes; for if their eyes meet, he must bow.

Meeting in the Street. If, while walking with one friend in the street, you meet another and stop a moment to speak to the latter, it is not necessary to introduce the two who are strangers to one another; but when you separate the friend who accompanies you gives a parting salutation, the same as yourself. The same rule applies if the friend you meet chances to be a lady.

Introducing Yourself. If, on entering a drawing-room to pay a visit, you are not recognized, mention your name immediately. If you know but one member of the family and you find others only in the room, introduce yourself to them. Unless this is done, much awkwardness may be occasioned.

Shaking Hands. When a lady is introduced to a gentleman she should merely bow but not give her hand, unless the gentleman is a well known friend of some member of the family. In that case she may do so if she pleases, as a mark of esteem or respect. A gentleman must not offer to shake hands with a lady until she has made the first movement.

A married lady should extend her hand upon being introduced to a stranger brought to her house by her husband or common friend, as an evidence of her cordial welcome.

NEW-YEAR'S CALLS. The custom of New-Year's calling is so prevalent in cities, and most villages, that we deem a few paragraphs on the etiquette of New-Year's calling necessary. Often a farmer's wife or daughter wishes to "receive" with a friend or relative in the village or city, or the farmer or his sons may be in the city and wish to make New-Year's calls, and not being accustomed to such will neglect it, or meet with many embarrassments in receiving or making them. We thus append a few of the simplest rules to be observed in both receiving and calling.

January first is the day when gentlemen keep up their acquaintanceship with ladies and families, some of whom they are unable to see, probably, during the whole year. For convenience, and to add to the pleasure of the day, several ladies frequently unite in receiving calls at the residence of one of their number, but this is usually done when only one or two members of a family can receive. When there are several members of a family who can do so, they usually receive at their own home.

Gentlemen call either singly, in couples, by threes or fours, and sometimes even more, in carriages or on foot, as they choose. Calls commence about ten o'clock in the morning, and continue until about nine in the evening. When the gentlemen go in parties they call upon the lady friends of each, and if all are not acquainted those who are introduce the others. The length of a call is usually from five to fifteen minutes, but it is often governed by circumstances and may be prolonged to even an hour.

Refreshments are usually provided for the callers, and should always be offered, but it is not necessary that they should be accepted. If not accepted, an apology should be tendered, with thanks for the offer. The refreshments may consist of oysters, raw or scalloped, cold meats, salads, fruits, cakes, sandwiches, etc., and hot tea and coffee.

When callers are ushered into the reception-room, they are met by the ladies, when introductions are given, and the callers are invited to remove their overcoats, but it is optional with them whether they do so or not. It is also optional with them whether they remove their gloves.

A gentleman may call at the house of a friend whether he knows they are receiving or not. If they are not receiving leave your card. In some places families not receiving calls close the front windows of the house, and hang a tasteful basket from the knob of the front door. The visitor simply deposits his card in the basket without ringing the bell.

Gentlemen provide themselves with cards which vary in style with the seasons, and according to the tastes of the different individuals. They leave one at each place where they have called, and where more than one lady is receiving together a card is left for each one. Ladies generally preserve these cards, as they constitute a pleasant reminiscence of the occasion.

PUBLIC PLACES. All well-bred persons will conduct themselves at all times and in all places with perfect decorum. Wherever they meet people they will be found polite, considerate of the comfort, convenience and wishes of others, and unobtrusive in their behavior. Many people, however, either from ignorance, thoughtlessness or carelessness, are constantly violating some of the observances of etiquette pertaining to places of public assemblages. It is for this reason that rules are here given by which may be regulated the conduct of people in various public gatherings, where awkwardness and ostentatious display often call forth unfavorable criticism.

Conduct in Church. A gentleman should remove his hat upon entering the auditorium of a church.

When visiting a strange church, you should wait in the vestibule or just inside the door, until an usher appears to show you to a seat.

A gentleman may walk up the aisle either a little ahead of, the lady or by her side, allowing her to first enter the pew. There should be no haste in passing up the aisle.

People should preserve the utmost silence and decorum in church, and avoid whispering, laughing, staring, or making a noise of any kind with the feet or hands.

It is ill-mannered to be late at church. If one is unavoidably late, it is better to take a pew as near the door as possible.

Ladies always take the inside seats, and gentlemen the outside or head of the pew. When a gentleman accompanies a lady, however, it is customary for him to sit by her side during church services.

A person should never leave church until the services are over, except in some case of emergency.

Do not turn around in your seat to gaze at anyone, to watch the choir, to look over the congregation or to see the cause of any disturbing noise.

If books are passed in church, let them be offered and accepted, or refused with a silent gesture of the head.

It is courteous to see that strangers are provided with books; and if the service is strange to them, the places for the day's reading should be indicated.

It is pefectly proper to offer to share the prayer-book or hymn-book with a stranger if there is no separate book for his use.

In visiting a church of a different belief from your own, pay the utmost respect to the services and conform in all things to the observances of the church; that is, kneel, sit and rise with the congregation. No matter how grotesquely some of the forms and observances may strike you, let no smile or contemptuous remark indicate the fact while in the church.

When the services are concluded, there should be no haste in crowding up the aisle, but the departure should be conducted quietly and decorously. When the vestibule is reached, it is allowable to exchange greetings with friends, but here there should be no loud talking nor boisterous laughter.

Invitation to Opera or Concert. A gentleman, upon inviting a lady to accompany him to opera, theater, concert, or other public place of amusement, must send his invitation the previous day. The lady must reply immediately, so that if she declines, there will yet be time for the gentleman to secure another companion.

Conduct in Theater, Opera, or Public Hall. On entering the hall, theater, or opera house, the gentleman should walk side by side with his companion unless the aisle is too narrow, in which case he should precede her. Upon reaching the seats, he should allow her to take the inner one, assuming the outer one himself.

A gentleman should, on no account, leave the lady's side from the beginning to the close of the performance.

If it is a promenade concert or opera, the lady may be invited to promenade during intermission. If she declines, the gentleman must retain his position by her side.

There is no obligation whatever upon a gentleman to give up his seat to a lady. On the contrary, his duty is solely to the lady whom he accompanies. He must remain beside her during the evening to converse with her between the acts, and to render the entertainment as agreeable to her as possible.

During the performance complete quiet should be preserved, that the audience may not be prevented from seeing or hearing. Between the acts it is perfectly proper to converse, but it should be done in a low tone, so as not to attract attention. Neither should one whisper.

It is proper and desirable that the actors be applauded when they deserve it. It is their only means of knowing whether they are giving satisfaction.

The gentleman should see that the lady is provided with a programme, and with a libretto also if they are attending opera.

In passing out at the close of the performance the gentleman should precede the lady, and there should be no crowding or pushing.

If the means of the gentleman warrant him in so doing, he should call for his companion in a carriage. This is especially necessary if the evening is stormy. He should call sufficiently early to allow them to reach their destination before the performance commences.

SALUTATION. In meeting a friend upon the road, street, or in company, you should make your salutation quietly, but cordially and with dignity, always paying the highest respect to the person saluted.

The Bow. Gentlemen should always salute a lady by raising the hat and making a formal bow. Between gentlemen an inclination of the head, a gesture of the hand, or mere touching of the hat is sufficient. If you know people slightly, you recognize them slightly; if you know them well you bow with more familiarity. The body is not bent at all in bowing; the inclination of the head is all that is necessary.

If the gentleman is smoking he withdraws his cigar from his mouth before lifting his hat to a lady, or if he should happen to have his hand in his pocket he removes it.

At the moment of the first meeting of the eyes of an acquaintance you bow. Any one who has been introduced to you, or any one to whom you have been introduced, is entitled to this mark of respect.

The bow is the touchstone of good breeding, and to neglect it, even to one with whom you may have a trifling difference, shows deficiency in cultivation and in the instincts of refinement. A bow does not entail a calling acquaintance. Its entire neglect reveals the character and training of the person; the manner of its observance reveals the very shades of breeding that exist between the ill-bred and the well-bred.

Returning a Bow. A gentleman walking with a lady returns a bow made to her, whether by a lady or gentleman (lifting his hat not too far from his head), although the one bowing is an entire stranger to him.

It is civility to return a bow, although you do not know the one who is bowing to you. Either the one who bows knows you, or has mistaken you for some one else. In either case you should return the bow and probably the mistake will be discovered to have occurred for want of quick recognition on your own part, or from some resemblance that you bear to another.

How to Avoid Recognition. If a person desires to to avoid a bowing acquaintance with a person who has been properly introduced, he may do so by looking aside, or dropping the eyes as the person approaches, for, if the eyes meet there is no alternative; bow he must.

On Public Promenades. Bowing once to a person upon a public promenade or drive is all that civility requires. If the person is a friend, it is in better form, the second and subsequent passings, should you catch his or her eye, to smile slightly instead of bowing repeatedly. If an acquaintance, it is best to avert the eyes.

It is very proper that farmers driving with their wagons or carriages on the country roads should salute one another, though they be not acquainted.

Words of Salutation. The words commonly used in saluting a person are "Good Morning," "Good Afternoon," "Good Evening," "How do you do?" (sometimes contracted into "Howdy" and "How dye do?") and "How are you?" The three former are most appropriate, as it seems somewhat absurd to ask after a person's health unless you stop to receive an answer. A respectful bow should accompany the words.

Hand-shaking. An authority upon this subject says: "The etiquette of hand-shaking is simple. A man has no right to take a lady's hand until it is offered. He has even less right to pinch or retain it. Two ladies shake hands gently and softly. A young lady gives her hand, but does not shake a gentleman's unless she is his friend. A lady should always rise to give her hand; a gentleman, of course never dares to do so seated. On introduction in a room, a married lady generally offers her hand; a young lady, not. In a ball-room, where the introduction is to dancing, not to friendship, you never shake hands; as a general rule, an introduction is not followed by shaking hands,—only by a bow. It may perhaps be laid down that the more public the place of introduction, the less hand-shaking takes place. But if the introduction be particular, if it be accompanied by personal recommendation, such as, 'I want you to know my friend Jones;' or if Jones comes with a letter of presentation, then you give Jones your hand, and warmly, too. Lastly, it is the privilege of the superior to offer or withhold his or her hand, so that an inferior should never put his forward first."

When a lady so far puts aside her reserve as to shake hands at all, she should give her hand with frankness and cordiality. There should be equal frankness and cordiality on the gentleman's part, and even more warmth, though a careful avoidance of anything like offensive familiarity or that which might be mistaken as such.

In shaking hands, the right hand should always be offered, unless it be so engaged as to make it impossible, and then an excuse should be offered. The French give the left hand, as nearest the heart,—which as a matter of fact is not true, as it is exactly in the center, or if any difference slightly to the right.

The mistress of a household should offer her hand to every guest invited to her house.

A gentleman must not shake hands with a lady until she has made the first move in that direction. It is a mark of rudeness not to give his hand instantly, should she extend her own.

The Kiss. This is the most affectionate form of salutation, and is only proper among near relations and dear friends.

The kiss of friendship and relationship is on the cheeks and forehead. In this country this act of affection is generally excluded from public eyes, and in the case of parents and children and near relations, it is perhaps necessarily so.

The custom which has become quite prevalent of women kissing each other when they meet in public, is regarded as vulgar, and by ladies of delicacy and refinement is entirely avoided.

STREET ETIQUETTE. The manners of a person are clearly shown by his treatment of the people he meets on the public roads, in the streets of a city or village, in public conveyances and in traveling generally. The true gentleman, at all times, in all places, and under all circumstances, is kind and courteous to all he meets, regards not only the rights, but the wishes and feelings of others, is deferential to women and to elderly men, and is ever ready to extend his aid to those who need it.

The true lady walks the street wrapped in a mantle of proper reserve so impenetrable that insult and coarse familiarity shrink from her, while she, at the same time, carries with her a congenial atmosphere which attracts all, and puts all at their ease.

A lady walks quietly through the streets, seeing and hearing nothing that she ought not to see and hear, recognizing acquaintances with a courteous bow, and friends with words of greeting. She is always unobtrusive, never talks loudly or laughs boisterously, or does anything to attract the attention of the passers by.

Recognizing Friends. No one, while walking the streets, should fail to recognize friends or acquaintances, either by a bow or some form of salutation. If two gentleman stop to talk they should retire to one side of the walk. If a stranger should be in company with one of the gentleman an introduction is not necessary. If a gentleman meets another gentleman in company with a lady whom he does not know, he lifts his hat to salute them both. If he knows the lady he should salute her first. The gentleman who accompanies a lady always returns a salutation made to her

A Crowded Street. When a gentleman and lady are walking in the street, if at any place, by reason of the crowd, or from other cause, they are compelled to proceed singly, the gentleman should always precede his companion.

The First to Bow. In England strict etiquette requires that a lady, meeting upon the street a gentleman with whom she has acquaintance, shall give the first bow of recognition. In this country, however, good sense does not insist upon an imperative following of this rule. A well-bred man bows and raises his hat to every lady of his acquaintance whom he meets, without waiting for her to take the initiative. If she is well-bred she will certainly respond to his salutation. As politeness requires that each salute the other, their salutations will thus be simultaneous.

Talking with a Lady in the Street. In meeting a lady it is optional with her whether she shall pause to speak. If the gentleman has anything to say to her he should not stop her, but turn around and walk in her company until he has said what he has to say, when he may leave her with a bow and lift of the hat.

Manner of Walking Together. A gentleman walking with a lady should treat her with the most scrupulous politeness, and may take either side of the walk. It is customary for the gentleman to have the lady on his right-hand side, and he offers her his right arm when walking arm in arm. If, however, the street is crowded, the gentleman must keep the lady on that side of him where she will be the least exposed to crowding.

Offering the Arm to a Lady. A gentleman should, in the evening, or whenever her safety, comfort or convenience seems to require it, offer a lady companion his arm. At other times it is not customary to do so unless the parties be husband and wife or engaged. In the latter case, it is not always advisable to do so, as they may be made the subject of unjust remarks.

Keeping Step. In walking together, especially when arm in arm, it is desirable that the two keep step. Ladies should be particular to adapt their pace as far as practicable to that of their escort. It is easily done.

Opening the Door for a Lady. A gentleman should always hold open the door for a lady to enter first. This is obligatory, not only in the case of the lady who is with him, but also in that of any strange lady who chances to be about to enter at the same time. A gentleman must never pass before a lady anywhere, if he can avoid it, or without an apology.

Offensive Behavior. No gentleman is ever guilty of the offense of standing on street corners and the steps of hotels or other public places and boldly scrutinizing every lady who passes.

Carrying Packages. A gentleman will never permit a lady with whom he is walking to carry a package of any kind, but will insist upon relieving her of it. He may even accost a lady when he sees her overburdened and offer his assistance, if their ways lie in the same direction.

SHOPPING ETIQUETTE. In inquiring for goods at a store or shop, do not say to the clerk or salesman, "I want" such an article, but, "Please show me" such an article, or some other polite form of address.

You should never take hold of a piece of goods or an article which another person is examining. Wait until it is replaced upon the counter, when you are at liberty to examine it.

It is rude to interrupt friends whom you meet in a store before they have finished making their purchases, or to ask their attention to your own purchases. It is rude to offer your opinion unasked, upon their judgment or taste in the selection of goods.

It is rude to sneer at and depreciate goods, and exceedingly discourteous to the salesmen. Use no deceit, but be honest with them, if you wish them to be honest with you.

Avoid "jewing down" the prices of articles in any way. If the price does not suit, you may say so quietly, and depart, but it is generally best to say nothing about it.

It is an insult for the salesman to offensively suggest that you can do better elsewhere, which should be resented by instant departure.

Ladies should not monopolize the time and attention of salesmen in small talk, while other customers are in the store to be waited upon.

Whispering in a store is rude. Loud and showy behavior is exceedingly vulgar.

TABLE ETIQUETTE. When friends have been invited to dinner or tea they should be prompt and not keep the hostess and other guests waiting. When dinner is announced the master of the house offers his right arm to that lady to be escorted by him; the others follow, arm in arm, the hostess being the last to enter the dining-room. Age should take the precedence in proceeding to the dining-room, the younger falling back until the elder have advanced. The host escorts the eldest lady or greatest stranger, or if there be a bride present, precedence is given to her, unless the dinner is given for another person, in which case he escorts the latter. The host places the lady whom he escorts at his right. The hostess is escorted either by the greatest stranger, or some gentleman whom she wishes to place at the seat of honor, which is at her right. The seats of the host and hostess may be in the middle and at opposite sides of the table, or at the opposite ends. Husbands should not escort their wives, or brothers their sisters, as this partakes of the nature of a family gathering.

Courses. Soup is the first course. All should accept it even if they let it remain untouched, because it is better to make a pretense of eating until the next course is served, than to sit waiting, or compel the servants to serve one before the rest. Soup should not be called for a second time. A soup-plate should never be tilted for the last spoonful.

Fish follows soup and must be eaten with a fork, unless fish knives are provided. If fish knives are not provided, a piece of bread in the left hand answers the purpose as well, with the fork in the right hand.

Fish may be declined, but must not be called for a second time.

After soup and fish come the side dishes, which must be eaten with the fork, though the knife is used in cutting meats and anything too hard for a fork.

For the carving of meats poultry and game, see Carving.

The Knife and Fork. The knife and fork were not made for playthings, and should not be used as such when people are waiting at the table for the food to be served. Do not hold them erect in your hands at each side of the plate, nor cross them on your plate when you have finished, nor make a noise with them. The knife should only be used for cutting meats and hard substances, while the fork, held in the left hand, is used in carrying food into the mouth. A knife must never on any account be put into the mouth. When you send your plate to be refilled, do not send your knife and fork, but put them on a piece of bread, or hold them in your hand.

Greediness. To put large pieces of food into your mouth appears greedy, and if you are addressed when your mouth is so filled, you are obliged to pause, before answering, until the vast mouthful is masticated, or run the risk of choking, by swallowing it too hastily. To eat very fast is also a mark of greediness, and should be avoided. The same may be said of soaking up gravy with bread, scraping up sauce with a spoon, scraping your plate and gormandizing upon one or two articles of food only.

General Rules on Table Etiquette. Refrain from making a noise when eating or supping from a spoon, and from smacking the lips or breathing heavily while masticating food, as they are marks of ill-breeding. The lips should be kept closed in eating, as much as possible.

Cheese is eaten with a fork and not with a knife. Vegetables are eaten with a fork.

Bread is broken at dinner.

You are at liberty to refuse a dish that you do not wish to eat. If any course is set down before you that you do not wish, do not touch it. Never play with food, nor mince your bread, nor handle the glass and silver near you unnecessarily.

When a dish is offered you, accept or refuse at once, and allow the waiter to pass on. A gentleman will see that the lady whom he has escorted to the table is helped to all she wishes, but it is officiousness to offer to help other ladies who have escorts.

If the guests pass the dishes to one another instead of being helped by a servant, you should always help yourself from the dish, if you desire it at all, before passing it on to the next.

Be careful to remove the bones from the fish before eating. If a bone inadvertently should get into the mouth, the lips must be covered with the napkin in removing it. Cherry stones and grape skins should be removed from the mouth as unobtrusively as possible, and deposited on the side of the plate.

Never use a napkin in place of a handkerchief for wiping the forehead, face, or nose.

Pastry should be eaten with a fork. Everything that can be cut without a knife should be eaten with the fork alone. Pudding may be eaten with a fork or spoon.

Never lay your hand, or play with your fingers, upon the table. Do not toy with your knife, fork, or spoon, make crumbs of your bread, or draw imaginary lines upon the table-cloth.

Never bite fruit. An apple, peach or pear should be peeled with a knife, and all fruit should be broken or cut.

Do not hesitate to take the last piece of bread or cake in a dish handed to you. Your host has more for other guests.

When a plate containing food is handed to you, set it down before you, and do not pass it to your neighbor.

Do not keep others waiting for you either at the beginning or close of the meal.

Do not sip soup from the tip, but from the side of the spoon.

Be careful not to drop or spill anything on the tablecloth.

Keep your plate neat; do not heap all sorts of food on it at once.

In passing your plate to be re-helped, retain the knife and fork.

When asked for a dish, do not shove, but hand it.

While drinking do not look around.

Instruct the servant to hand the cup at the left side so that it may be received by the right hand.

Do not drink your tea or coffee without first removing the teaspoon from the cup to the saucer. We need hardly say that it should not be poured into the saucer to cool.

Break your bread into small pieces and rest them on your plate while spreading.

Do not eat too fast; besides giving one the appearance of greed, it is not healthful.

If you find anything unpleasant in your food put it aside as quietly as possible, without drawing the attention of others to it.

Do not open the lips nor make any unnecessary noise in chewing.

Do not rest the elbow on the table.

Do not touch the head.

Do not speak with the mouth full.

Brush the table neatly before bringing on the dessert.

Be thoughtful of and attentive to the wants of those sitting near you.

Converse on pleasant subjects with those sitting near you.

Do not say anything not intended for all present to hear.

Never pick your teeth at the table.

Do not begin to eat meat until you have all the accessories—the vegetables and gravy.

Do not load your plate with different kinds of vegetables. Eat them with a fork.

Leave your plate with the knife and fork lying parallel, the handles pointing to the right.

Never leave the table before others without asking the lady or gentleman who presides, to excuse you.

TRAVELING. In these days of railroad travel, when every railway is equipped with elegant coaches for the comfort, convenience and sometimes luxury of its passengers, and provided with gentlemanly conductors and servants, the longest journeys by railroad can be made alone by self-possessed ladies with perfect safety and but little annoyance.

Duties of an Escort. When a gentleman undertakes the escort of a lady, he should proceed with her to the depot, or meet her there a sufficient time before the departure of the train to attend to the checking of her baggage, procure her ticket, and obtain for her an eligible seat in the cars, allowing her to choose such seat as she desires. He will then dispose of her packages and hand-baggage in their proper receptacle, and make her seat and surroundings as agreeable for her as possible, taking a seat near her, or by the side of her if she requests it, and do all he can to make her journey a pleasant one.

Upon arriving at her destination, he should conduct her to the ladies' waiting-room or to a carriage, until he has attended to her baggage, which he arranges to have delivered where the lady requests it. He should then escort her to whatever part of the city she is going and deliver her into the hands of her friends before relaxing his care.

The Duty of a Lady to her Escort. The lady may supply her escort with a sum of money, ample to pay all the expenses of the journey, before purchasing her ticket, or furnish him the exact amount required, or, at the suggestion of her escort, she may allow him to defray the expenses from his own pocket, and settle with him at the end of the journey. The latter course, however, should only be pursued when the gentleman suggests it, and a strict account of the expenses incurred must be insisted on.

A Lady Traveling Alone. A lady in traveling alone may accept services from her fellow-travelers, which she should always acknowledge graciously. Indeed, it is the business of a gentleman to see that the wants of an unescorted lady are attended to. He should offer to raise or lower her window if she seems to have any difficulty in doing it herself. He may offer his assistance in carrying her packages upon leaving the car, or in engaging a carriage or obtaining a trunk. Still, women should learn to be as self-reliant as possible; and young women particularly should accept proffered assistance from strangers, in all but the slightest offices, very rarely.

The Comfort of Others. In seeking his own comfort, no passenger has a right to overlook or disregard that of others. If for his own comfort, he wishes to raise or lower a window he should consult the wishes of the passengers immediately around him before doing so. The discomfort of traveling should be borne cheerfully, for what may enhance your own comfort may endanger the health of some fellow-traveler.

Attending to the Wants of Others. See everywhere and at all times that ladies and elderly people have their wants supplied before you think of your own. Nor is there need for unmanly haste or pushing in entering or leaving cars or boats. There is always time enough allowed for each passenger to enter in a gentlemanly manner and with a due regard to the rights of others.

If, in riding in the street-cars or crossing a ferry, your friend insists in paying for you, permit him to do so without serious remonstrance. You can return the favor at some other time.

Occupying too many Seats. No lady will retain possession of more than her rightful seat in a crowded car. When others are looking for accommodations she should at once and with all cheerfulness so dispose of her baggage that the seat beside her may be occupied by any one who desires it, no matter how agreeable it may be to retain possession of it.

It shows a great lack of proper manners to see two ladies, or a lady and gentleman, turn over the seat in front of them and fill it with their wraps and bundles, retaining it in spite of the entreating of remonstrating looks of fellow-passengers. In such a case any person who desires a seat is justified in reversing the back, removing the baggage and taking possession of the unused seat.

Retaining Possession of a Seat. A gentleman in traveling may take possession of a seat and then go to purchase tickets or look after baggage or procure a lunch, leaving the seat in charge of a companion, or depositing traveling-bag or overcoat upon it to show that it is engaged. When a seat is thus occupied the right of possession must be respected, and no one should presume to take a seat thus previously engaged, even though it may be wanted for a lady. A gentleman cannot, however, in justice vacate his seat to take another in a smoking-car, and at the same time reserve his rights to the first seat. He pays for but one seat, and by taking another he forfeits the first.

It is not required of a gentleman in a railway car to relinquish his seat in favor of a lady, though a gentleman of genuine breeding will do so rather than allow the lady to stand or suffer inconvenience from poor accommodations.

WEDDINGS. The circumstances under which weddings take place are so varied, and the religious forms observed in their solemnization so numerous, that to lay down rules applicable to all cases would be a matter of great difficulty, if not an impossibility.

The Bridesmaids and Groomsmen. Only relatives and the most intimate friends are asked to be bridesmaids—the sisters of the bride and of the bridegroom, where it is possible. The bridegroom chooses his best man and the groomsmen and ushers from his circle of relatives and friends of his own age, and from the relatives of his fiancee of a suitable age. The dresses of the bridesmaids are not given unless their circumstances are such as to make it necessary.

Wedding Dress. It is impossible to lay down specific rules for dress, as fashions change and tastes differ. The great art consists in selecting the style of dress most becoming to the person. A stout person should adopt a different style from a thin person; a tall one from a short one. Peculiarities of complexion and form of face and figure should be duly regarded; and in these matters there is no better course than to call in the aid of any respectable milliner and dressmaker, who will be found ready to give the best advice. The bridegroom should simply appear in full dress, and should avoid everything eccentric and broad in style. The bridesmaids should always be made aware of the bride's dress before they choose their own, which should be determined by a proper harmony with the former.

Ceremonials. When there are no bridesmaids or ushers the marriage ceremonials at the church are as follows: The members of the bride's family proceed to the church before the bride, who follows with her mother. The bridegroom awaits them at the church and gives his arm to the bride's mother. They walk up the aisle to the altar, the mother falling back to her position on the left. The father, or relative representing him, conducts the bride to the bridegroom, who stands at the altar with his face turned toward her as she approaches, and the father falls back to the left. The relatives follow, taking their places standing; those of the bride to the left, those of the groom to the right. After kneeling at the altar for a moment, the bride, standing on the left of the bridegroom, takes the glove off from her left hand, while he takes the glove off from his right hand. The service then begins. The father of the bride gives her away by bowing when the question is asked, which is a much simpler form than stepping forward and placing his daughter's hand in that of the clergyman. Perfect self-control should be exhibited by all parties during the ceremony.

The bride leaves the altar, taking the bridegroom's right arm, and they pass down the aisle without looking to the right or left. It is considered improper to recognize acquaintances by bows and smiles while in the church.

The bride and bridegroom drive away in their own carriage, the rest following in their carriages.

Another Form of Church Ceremonials. The ceremonials for the entry to the church by the bridal party may be varied to suit the taste. Precedents for the style already described are found among the highest social circles in New York and other large cities, but there are brides who prefer the fashion of their grandmothers, which is almost strictly an American fashion. In this style, the bridesmaids, each leaning upon the arm of a groomsman, first pass up the aisle to the altar, the ladies going to their left, and the gentlemen to their right. The groom follows with the bride's mother, or some one to represent her, leaning on his arm, whom he seats in a front pew at the left. The bride follows, clinging to the arm of her father (or a near relative), who leads her to the groom. The father waits at her left and a step or two back of her, until asked to give her away, which he does by taking her right hand and placing it in that of the clergyman. After this he joins the mother of the bride in the front pew, and becomes her escort while they pass out of the church.

In case there are no bridesmaids, the ushers walk into church in pairs, just in advance of the groom, and parting at the altar, half of them stand at one side and half at the other. While the clergyman is congratulating the bride, they pass out in pairs, a little in advance of the wedded couple.

Weddings at Home. Weddings at home vary but little from those at church. The music, the assembling of friends, the entree of the bridal party to the position selected, are the same. An altar of flowers and a place of kneeling can be easily arranged at home. The space behind the altar need be no wider than is allowed for the clergyman to stand. The altar is generally only a fender or railing entirely wound and concealed by greenery or blossoms. Other floral accessories, such as the marriage-bell, horse-shoe or white dove, etc., can be arranged with ease by a skillful florist, if desired.

When the marriage ceremony is concluded, the party turn in their places and face their friends, who proceed to congratulate them. If space be required, the kneeling-stool and floral altar may be removed, a little later, without observation.

The Evening Wedding. If the wedding occur in evening, the only difference in the ceremonials from those in the morning is that the ushers or groomsmen wear full evening dress, and the bridal pair retire quietly to dress for their journey before the dancing party disperses, and thus leave unobserved. At the morning wedding only bridesmaids, ushers and relatives remain to witness the departure of the pair.

"At-Home" Receptions. When the newly married couple commence life in a home of their own, it is customary to issue "at-home" cards for a few evenings, at an early date after the wedding, for informal receptions. Only such persons are invited as the young couple wish to keep as friends, or perhaps only those whom they can afford to retain. This is a suitable opportunity to carefully re-arrange one's social list, and their list of old acquaintances may be sifted at the time of the beginning of housekeeping. This custom of arranging a fresh list is admitted as a social necessity, and nobody is offended.

Calls. All guests and friends who receive "at-home" invitations, or who are invited to the church, are required by etiquette to call upon the family of the bride, or to leave their cards, within ten days after the wedding.

Wedding Ring. Many churches at present use the ring, and vary the sentiment of its adoption to suit the customs and ideas of their own rites. A jeweled ring has been for many years the sign and symbol of betrothal, but at present a plain gold circlet, with the date of the engagement inscribed within, is generally preferred. This ring is removed by the groom at the altar, passed to the clergyman and used in the ceremony. A jeweled ring is placed upon her hand by the groom on the way home from the church, or as soon after the service as is convenient. It stands guard over its precious fellow, and is a confirmation of the first promise.

The Marriage Ceremonials of a Widow. The marriage ceremonials of a widow differ from those of a young lady in not wearing the veil and orange blossoms. She may be costumed in white and have her maids at the altar if she pleases. This liberty, however, has only been given her within a few years. On her wedding cards of invitation her maiden name is used as a part of her proper name; which is done in respect to her parents. Having dropped the initials of her dead husband's name when she laid aside her mourning, she uses her Christian name. If she has sons or unmarried daughters at the time she becomes again a wife, she may prefix the last name of her children to her new one on all ceremonious occasions in which they are interested in common with herself. This respect is really due them, and etiquette permits it, although our social usages do not command its adoption. The formalities which follow the marriage of a widow can seldom be regulated in the same manner as those of a younger bride. No fixed forms can be arranged for entertainments, which must be controlled by circumstances.

Invitations. Wedding invitations should be handsomely engraved in script. Neither Old English nor German Text is admissible in invitations. The following is given as the latest form for invitations:

MR. & MRS. CLIFFORD MORTIMER,
request your presence at the marriage of their daughter,
MISS CORA MORTIMER,
TO
MR. MILO C. JOHNSON,
on Wednesday, March 6th, at one o'clock.
SUMMER HILL CHURCH.

This invitation requires no answer.

In some circles the young couple send out cards stating the day and hour they will receive callers, after their return from their wedding tour. These are enclosed in the same envelope as the invitation, and generally on a square card, the same size as the sheet of note paper which bears the invitation for the ceremony after it has been once folded across the middle. The following is one of the adopted forms:

AT HOME,
Wednesday, September 7th,
from 12 until 3 o'clock.

Separate cards of the bride and groom are no longer necessary.

The Wedding Fees. There is no prescribed fee for performing the marriage ceremony. It is regulated according to the means and liberality of the bridegroom, but no less amount than five dollars should be given under any circumstances.

Wedding Tour. The wedding tour should be definitely arranged before the marriage. It is best that the young couple should make the tour unaccompanied by any of their friends.

A Home. After marriage one of the first requirements for happiness is a home. This can seldom be found in a boarding house or at a hotel, and not always beneath the parental roof of either husband or wife. It will oftenest be found in a house or even a cottage apart from the immediate association of relatives or friends, acquaintances or strangers, and here husband and wife may begin in reality that new life of which they have had fond dreams, and upon their own actions must depend their future welfare.

MISCELLANEOUS RULES. A gentleman precedes a lady passing through a crowd; ladies precede gentlemen under ordinary circumstances.

Give your children, unless married, their Christian names only, or say "my daughter" or "my son," in speaking of them to any one except servants.

Ladies in escorting each other never offer to take the arm.

Acknowledge an invitation to stop with a friend, or any unusual attention, without delay.

Never boast of birth, money or friends, or of any superior advantages you may possess.

Never ridicule others, be the objects of your ridicule present or absent.

Always show respect for the religious opinions and observances of others, no matter how much they may differ from your own.

You should never scratch your head, pick your teeth, clean your nails or pick your nose in company.

Never lean your head against the wall, as you may disgust your wife or hostess by soiling the paper of her room.

Never slam a door or stamp noisily on entering a room.

Always be punctual. You have no right to waste the time of others by making them wait for you.

Always hand a chair for a lady, pick up her glove and perform any little service she may seem to require.

Never attract attention to yourself by talking or laughing loudly in public gatherings.

Keep yourself quiet and composed under all circumstances. Do not get fidgety. If you feel that time drags heavily, do not let this be apparent to others by any visible sign of uneasiness.

Refrain from absent-mindedness in the presence of others. You pay them a poor compliment if you thus forget them.

Never refuse to accept an apology for an offense, and never hesitate to make one, if one is due from you.

Never answer another rudely or impatiently. Reply courteously, at whatever inconvenience to yourself.

Never intrude upon a business man or woman in business hours unless you wish to see them on business.

Never engage a person in private conversation in presence of others, nor make any mysterious allusions which no one else understands.

On entering a room, bow slightly as a general salutation, before speaking to each of the persons assembled.

Do not seem to notice, by word or glance, the deformity of another.

To administer reproof to any one in the presence of others is very impolite. To scold at any time is unwise.

Never undertake a commission for a friend and neglect to perform it.

Never play a practical joke upon any one, or answer a serious remark by a flippant one.

Never lend a borrowed book, and never keep such a book a single day after you are done with it.

Never pass between two persons who are talking together; and never pass before person's when it is possible to pass behind them. When such an act is absolutely necessary, always apologize for so doing.

"Never speak of a man's virtues before his face, or his faults behind his back," is a maxim to be remembered.

Another maxim is: "In private watch your thoughts; in your family watch your temper; in society watch your tongue."

Never address a mere acquaintance by his or her Christian name. It is a presumption at which the acquaintance may take offense.

Haughtiness and contempt are among the habits to be avoided. The best way is to deal courteously with the rude as well as with the courteous.

In the presence of others, talk as little of yourself as possible, or of the business or profession in which you are engaged.

It shows a want of courtesy to consult your watch, either at home or abroad. If at home, it appears as if you were tired of your company, and wished them to be gone. If abroad, it appears as though the hours dragged heavily, and you were calculating how soon you would be released.

Do not touch or handle any of the ornaments in the house where you visit. They are intended to be admired, not handled by visitors.

Do not read in company; a gentleman or lady may, however, look over a book of engravings or a collection of photographs with propriety.

Every species of affectation should be avoided, as it is always detected, and exceedingly disagreeable.

Impolite Acts. Loud and boisterous laughter.

Reading when others are talking.

Reading aloud in company without being asked.

Talking when others are reading.

Sitting about the house smoking or chewing.

Cutting finger-nails in company.

Leaving a church before public worship is closed.

Whispering or laughing in the house of God.

Gazing rudely at strangers.

Leaving a stranger without a seat.

A want of respect and reverence for seniors.

Correcting older persons than yourself, especially parents.

Receiving a present without an expression of gratitude.

Joking others in company.

Making yourself the hero of your own story.

Sitting with your back to a person without asking to be excused.

Standing or sitting with your feet apart.

Humming, whistling or singing in suppressed tones.

Using profane language, or stronger expressions than the occasion justifies.

Evaporation by Heat. The conversion of water into steam by heat is a familiar illustration of evaporation by heat, of which we need say nothing here. Liquids while evaporating absorb heat, and it is for this reason that ether, which requires comparatively little heat to convert it into vapor, is used to relieve the pain of a scald or a burn. Ether is converted into vapor at 96° Fahrenheit. Water, which requires 212° Fahrenheit to convert it into steam, is often sprinkled about a room in summer weather to cool the air, and it does so by withdrawing the heat which is absorbed during its evaporation. The refreshing coolness of a summer shower is due to the same cause. Winds aid evaporation by removing the vapor more rapidly. Grass allowed to remain in the garden uncut, or dead leaves allowed to accumulate on the paths, promote cold by retaining moisture and consequently absorbing heat. Wet feet and wet clothes absorb heat by evaporation, and by rapidly lowering the natural temperature of the body, so affect the circulation as to injure the health more or less seriously. A damp bed for the same reason is an extremely dangerous one to sleep in. Salt in the water retarding evaporation, sea-water consequently does not have the same effect as other water does. The rapidly revolving wheels of certain machines would catch fire if they were not kept constantly wet, in order that the heat might be kept down by evaporation. Tea poured into a saucer grows cool more quickly than it does in a cup, because, having a larger surface, evaporation proceeds more rapidly. Thick clothing worn while taking active exercise, by which the perspiration is increased, is often unhealthful because it retards evaporation, and so increases the heat of the body beyond its natural standard.

Evener (eav′-ner), a double-tree or whiffle-tree. See Whiffletree.

Evergreens, plants which retain their leaves green through the winter, and acquire a growth of new ones before fully shedding the old. In the United States they are mainly trees and shrubs of the pine and cedar kind, and constitute the most substantial and popular ornament of the lawn and landscape. They are also the best resource for wind-breaks, the Norway spruce being perhaps the best of all the trees in the world for the purpose.

Varieties. Among the smaller evergreens adapted to places of limited extent and village grounds are the following: The Mugho pine, growing 15 or 20 feet high, with numerous ascending or creeping branches, the foliage resembling that of the Scotch pine. It is sometimes confounded with the dwarf mountain pine, but differs in shorter leaves and more upright tree form. The mountain dwarf pine has a more rounded growth of the tree. A very small variety of the Mugho pine grows only about two feet high. The stone pine, although ultimately attaining 30 or 40 feet, grows so slow that for many years it keeps well within bounds, and forms a neat and handsome pyramid, varied by the tufts of foliage on its outline. The dwarf white pine is a bushy variety of the common white pine, of a compact form, growing from six to ten feet high. Another larger variety, known as the compacta, is double the size of the last named, making an annual growth of three or four inches, and forming a beautiful tree.

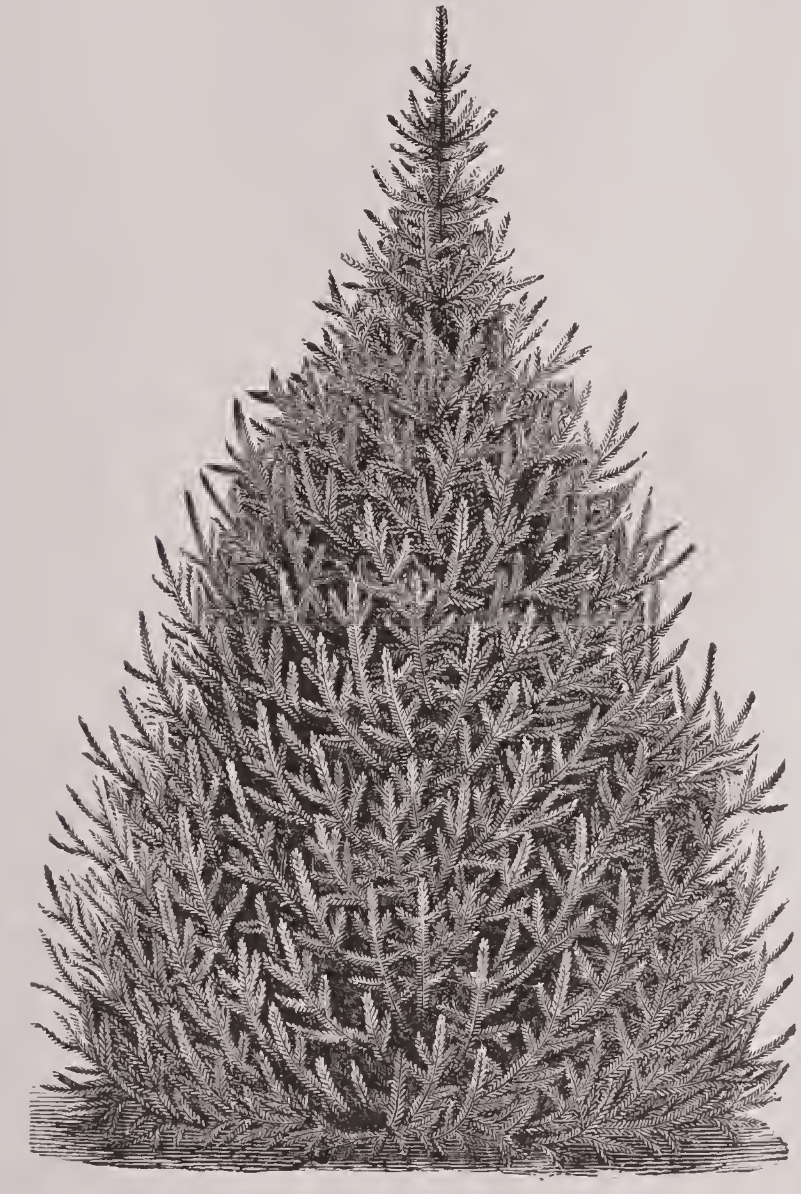


Fig. 1.—*White Spruce.*

There are several varieties of the Norway spruce of various sizes, from the pigmy fir, a foot high, to those that become small trees. The common Norway spruce may be kept to the size of a small tree or shrub by continually cutting back; there are, however, two objections, one of which is the common want of skill and taste required to preserve a graceful, natural form, instead of a heavy, formal or stiff figure; and the other the liability to neglect this cutting back until the tree has grown beyond the limited bounds allotted to it. The white spruce forms a handsome tree of moderate size, growing 40 or 50 feet high; and there is a dwarf variety about the size of a currant bush. A more beautiful tree is the black spruce, which has less stiffness and more grace of outline than many other spruces; it sometimes attains a height of 70 feet. The red spruce much resembles the black, and while some regard them as distinct species, others look upon them as only varieties.

There are some other rarer firs worthy of attention, among which are the Cephalonian fir and Nordmann's fir, the latter being regarded by some as the most beautiful and reliable of all the new sorts.

Among the larger pines, none can exceed, and few equal, the common white pine and the Austrian pine, while the native hemlock is one of the finest of all our evergreen trees, when allowed full space to grow and develop its graceful form.

Turning again to some of the smaller evergreens, we should not omit to mention the Siberian arbor-vitæ and the red cedar and common juniper. The tree box, although a slow grower, forms a beautiful broad and dense mass of green foliage, and becomes one of the best winter ornaments. Dwarf pine, a European species, is perfectly hardy, and easily transplanted, and grows in a dense rounded form ten or twelve feet high.

By a due share of attention to these winter ornaments, there is no necessity whatever for the bleak and dreary appearance of which so many complain, and even the bare branches and the shining buds which invest them become objects of study and delight. A proper blending and contrast in various shades of different evergreens may be made to give additional charms to the plantings of the grounds.

Small ornamental undergrowth beneath the trees and larger shrubs should not be overlooked, as it gives a beautiful effect late in autumn, early in spring, and when the ground is bare of snow in winter. Evergreen shrubs, like the wild yew; such small plants, with broad, thick, evergreen leaves, as the Chimaphila, and the evergreen ferns; the whole surface carpeted with such species of moss as give a soft, green surface, —all add greatly to the effect. Among the evergreen ferns very few may be mentioned. The common polypody is rather small, very hardy, and will grow on or among rocks. The hard fern is common along wooded ravines and hillsides, and is a large, handsome plant; also the Woodwardias and Aspleniums, and several Aspidiums, which may be easily collected in our wild woods early in spring.

Among the flowers that may be made to bloom in early winter is the Christmas rose, so called, which, if planted under the protection of evergreens, and on the south side, facing the sun, may be often seen in bloom half hid under the snow.

For early spring blooming, even before all the snowdrifts are gone, plant the bulbs of the snow-drop, crocus, and Siberian squill, in similarly sheltered places; and plant such early bloomers among the wild flowers of the woods as the Claytonia and Hepatica, and they will add greatly to the charms of the grounds while all the deciduous trees and shrubs are yet destitute of foliage, and buds have not begun to swell.

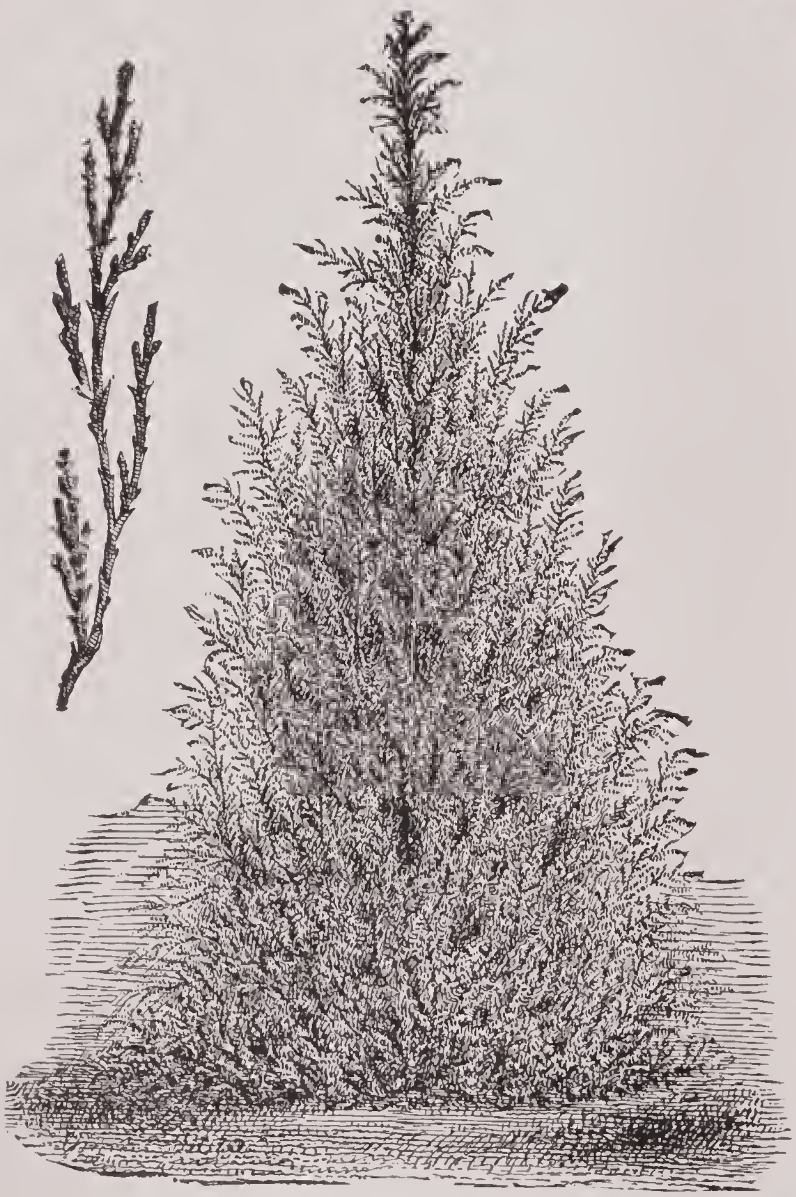


Fig. 2.—*Juniperus Venusta.*

Propagation. All evergreen seed needs planting in raised beds so that the water will run off, covered slightly with sand about a quarter of an inch deep, then shaded by a lath cover, leaving the spaces not wider than the lath, and of a convenient size to remove, both for watering and weeding. The object of the cover is to break the heat of the sun; in fact, make it cloudy. Brush about a foot above the bed will answer, with the leaves on. After the seedlings are well cared for, the first summer a light mulch should be given them, and in the spring following they can be transplanted to a new bed and shaded as before, and the second or third spring they can safely be set 12 by 8 feet, or 12 by 12 feet for timber. The pine, when three years old, may be 8 to 12 inches, and if well cultivated they will not be more than 10 feet high when ten years old. After that they grow much more rapidly. A good way to utilize the ground is to set larch 3 by 3 feet on all the ground between the pine, and after they become 8 to 10 feet high, thin out around the pine and give them room. Part of the larch may remain till they are 15 to 20 feet high, and will make good fence-posts, poles, etc. Nineteen out of twenty will fail in raising evergreen seedlings, and after they are removed from the seed-bed, there will be just as good a chance for failure, unless set thickly together and shaded. Forest seedlings and evergreens may be safely set out if kept damp and shaded the first year; they can be set 4 to 6 inches each way and remain one or two years in the transplanted bed, the first year always under shade. Select those specimens which are in the most exposed situations, protect the roots from the sun and air, and take the springtime for the work of transplanting. But it is much safer to transplant nursery-grown trees. Removals any time during the summer are often successful. Manure, mulch, and cultivate as you would any other tree.

Red cedar berries should be bruised early in March, and mixed with an equal or greater bulk of wet wood-ashes. In three weeks the alkali will have "cut" the resinons gum, when the seeds can be washed clean from the pulp. In preparing the seed-beds, dig the ground a foot or more in depth, mix for three or four inches at the surface a liberal dressing of well-rotted leaf-mold, or wood soil, and sharp sand. Lay off the beds 4 feet wide, lengthwise, east and west; sow the seeds in rows a foot apart, running across the bed. This gives room for deep culture, which is essential. Along the south side of the bed, drive stout stakes 1½ feet above the surface, also another row on the north side, 2½ feet high. Rails are nailed on the tops of the stakes, across which freshly cut brush with foliage on is placed, before very hot weather, to screen from the scorching rays of the sun; also, a wide board is laid along the south side of the short stakes, to keep out the sun and drying winds. If there is a prospect of drouth, water occasionally, in the evening. In October the shading may be removed, and a mulching of two inches of leaves put along the rows. Cultivate in seed-bed the second year; unless the season is very dry, they will need no shading if the ground is worked deeply. They are transplanted to nursery rows 2 feet apart the second spring, shortening the tap-root at the time. Give them plenty of room in the row to develop the lower branches. In taking up plants for sale the two succeeding seasons, it is best to thin them in the rows by removing each alternate plant. When three years in nursery, remove each alternate row and root-prune the ones left with a Harkness tree digger, an invaluable implement for nurserymen.

For ordinary screens of moderate height, the red cedar is preferable to any other evergreen for the Northwestern States.

Foreign varieties of evergreens are best imported at two years from the seed, and native varieties from the forests of Michigan and New York.

EVERGREEN SEEDS, NUMBER OF, TO THE POUND; Norway spruce, 58,000; Hemlock, 1000,000 White pine, 20,000; White spruce, 160,000; Scotch pine, 69,000; Austrian pine, 28,000; Balsam fir, 45,000; Cembran, or stone pine, 2,700; American arbor vitæ, 320,000; European larch, 70,000; pear and apple (not evergreen), 12,000. It is remarkable how these large trees have so small seeds compared with the nuts, etc., of other trees.

PRUNING. In pruning no one should cut a branch, large or small, evergreen or deciduous, without having a clear idea of what he does it for. Pruning may be done to accomplish the most opposite ends. We may prune to promote the growth of limb, or we may prune to check the growth, and so on. Whatever else is done to an evergreen, do not cut it away below. Left to themselves, these trees form pyramids of verdure of the greatest beauty. A tree with its broad base resting upon the ground, and tapering gracefully upwards, is a most pleasing object and gratifying in its symmetry and apparent stability to every person of taste. Cut away the lower limbs, leaving a naked trunk of six or eight feet, and all beauty and symmetry are destroyed. This treatment is often excused by the plea that the trees were at first planted too closely and now light and air are shut out; hence this cutting away of the lower branches. Light and air are of course necessary, but the better remedy is to take out a portion of the trees altogether. Do this rather than to mutilate all by removing the lower branches. If trees are too near the house, either remove or cut them down, but do not cut them "up." There is no proper time for pruning of this kind. If a tree grows one-sided, or irregular, and it is desired to have an increased growth at any point, the proper way to secure this is to cut the branches back to induce a new growth to push vigorously. Pruning for this purpose should be done when the season of growth is well matured in early autumn. If the irregularity is due to an excess of growth, and it is necessary to repress this, then the proper time to do it is immediately after the growth in length has been completed, but before the wood has become hardened and matured. Much may often be done to improve the form of a tree, and fill out their places by bending some of the branches and tying them in the proper position, taking care that the ligatures are nowhere so tight as to check the enlargement of the branches. If held thus for a few years, they will retain their position. The pruning of evergreen hedges is governed by the same rules. In the first years of a hedge, one wishes it to grow as quickly as possible to the required height; therefore if the growth can anywhere be encouraged by cutting back, it is to be done in early autumn. In the Northern States, October is the proper time. When the hedge is as high and broad as desired, and you wish to repress further growth, the main pruning should be done as soon as the spring's growth has been made, but while the shoots are still tender. Cutting in that state tends to check the growth. In the Northern States, June is the month for this. In cutting all horizontal branches half an inch or more in diameter, make a sloping cut on the under side of the branch, so that in looking down upon it the wound is not seen.

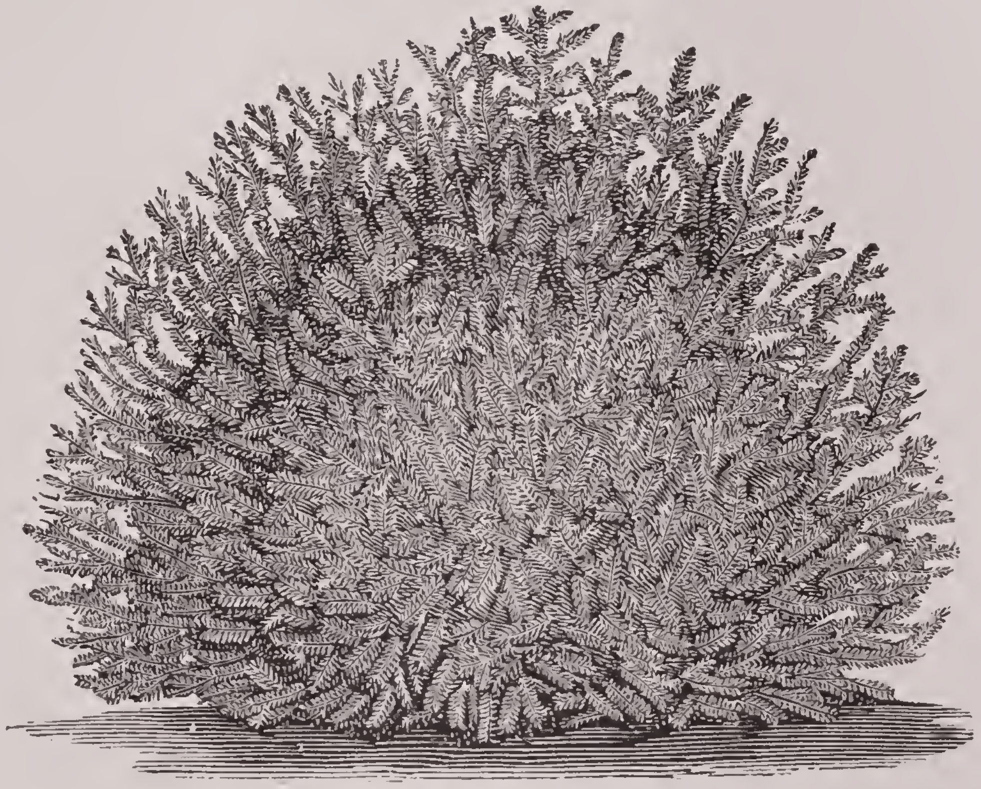


FIG. 3.—*Dwarf American Arbor Vitæ.*

See also Floriculture, Forestry Lawn and Lanscape Gardening.

Ewe (u), a female sheep.

Executors and Administrators. An executor in law is one appointed by a man's last will to carry its provisions into execution after the testator's death. Letters of executorship and administration must be taken out in the county where the deceased resided immediately preceding his death. Usually the widow and next other kindred have first right to administration unless there is a will appointing some person or persons. Administrators are required to give bond in double the amount of personal property of deceased. When the executor is authorized by will to sell property, the bond must be double the amount of the whole property, unless a bond is waived by the will. If relatives do not take out letters, then creditors are next in order. If no person petitions for letters, the probate court appoints some discreet person of its own motion. Executors appointed by will may refuse to act or resign by permission of the court.

Exemptions FROM SEIZURE ON EXECUTIONS. Each State provides by law that its *bona-fide* residents shall be allowed to own and hold certain specified property which shall be exempt from seizure upon any writ or execution for debt. Generally the exemption ceases when the debtor attempts to remove the exempted property from the State. Upon the death of the husband the exemption rights extend to the widow and minor children. The law is so different in the States we cannot give it all in this work, and can only say, the best way to obtain a knowledge of the same is to consult the statutes, which may be found at the justice's office and at all the public offices of the county.

Exercise: see Hygiene.

Exhaustion of Soils: see Fertilizers, Manure, etc.

Exhaust-Pipe, in a steam engine, is the pipe which permits the steam to escape from the cylinder, either to a condenser or to the open air.

Exhibition, AGRICULTURAL: see Fairs.

Exotic (egz-ot'ic,) foreign, as a plant which is not native. Palms, for example, are exotic in the Northern United States.

Expansion by Heat. Heat causes air to expand or grow lighter. A familiar illustration of this may be observed in roasting chestnuts. When they have been made sufficiently hot, the air and moisture in them expand, and being unable to escape, force their way violently through the thick rind, which bursts with a loud crack. Under the same influence even a stone when put into the fire flies into pieces. From a bottle of ale placed before a fire, the cork will sometimes be forced out by the expansion by heat of the carbonic acid. Hot air ascends a chimney in consequence of the lightness which is due to its expansion. It is expansion by heat which causes ice to melt into water and water to become steam. The kettle sings because the heated air is escaping unequally, and it does not sing when it boils, because the air is expanding equally. Water is increased in bulk by heat, just as air is, and hence it boils over. Iron expands by heat, and for this reason iron hoops used by coopers for tubs are put on hot, so that as they grow cold and contract, they may hold the pieces of the tub more securely together. The cracking of iron stoves is due to this cause. A glass is frequently broke by hot water being poured into it, because of its unequal expansion, the inside expanding suddenly with heat instead of gradually, while the outside surface is cold. Lamp glasses often break in consequence of this unequal expansion by heat. Glass is like china, a bad conductor of heat, and the heat of the inner surface permeates it so slowly that the outer surface is not affected by the heat which expands the inner surface, and is consequently torn asunder. A glass tumbler must not, therefore, be put upon a hot stove.

The force with which water expands when in the act of congelation is immense. It is by this means that huge fragments of rock are separated, the water that penetrates into fissures expanding with such force during congelation as to break off the corners and projections. The same circumstance is sometimes taken advantage of in splitting slate. The benefit that frost is known to afford to plowed land is effected by the expansion of water breaking and crumbling down the clods of earth. The sparks of fire which fly with a crackling noise from burning wood are due to the expansion of air in the pores of the wood. Ingenious modes of breaking glass in any required direction are founded on expansion, by which means broken glass vessels are very ingeniously fashioned and fitted for a variety of uses. One mode is to dip a piece of thread or string in spirits of turpentine, wrap it around the glass in the direction you require it to be broken, and then set fire to it. Another mode is to draw a red-hot skewer across the glass in the desired direction, and a third is to wrap a red-hot wire round the glass, and if it does not immediately crack, to throw cold water on it whilst the wire remains hot. The two former modes depend upon the sudden expansion, and the last upon the sudden contraction of the particles upon the surface of the glass.

The draughts of air perceived in rooms where large fires are burning consist of these currents of air rushing in to supply the place of expanded air escaping up the chimney. It is by facilitating the egress of the heated air that rooms are properly ventilated, and by contriving means to prevent its escape that stores and hot-houses are able to preserve their increased temperature.

Expectorant, a medicine or medicinal appliance which promotes the discharge of morbid mucous secretion of the air passages of animals, and, in consequence relieves cough and difficulty of breathing. Watery vapor, whether simple or medicated, is the only expectorant which acts directly or by immediate contact with the affected organs, and all the other expectorants, exceedingly great in number and variety, are gathered from among sedatives, vegetable stimulants, balsams, gum-resins, and other classes of substances; are swallowed like food or condiments, and can operate on the affected organs only by sympathy or by some other obscure mode of action. Expectorants for the human subject, as in instance of many of the popular and quack nostrums for common coughs, are sometimes so ill-chosen as to occasion great eventual injury to the patient. In the horse the action of expectorants is not easily perceptible. It has been said that as a horse breathes only through his nostrils the effect of such medicines (if they would have any), would be shown by a discharge from the nostrils, and as they are not observed to cause such discharge, they must be ineffectual. But in coughing air is expired by the mouth, and it is not improbable that mucus may be discharged by the lungs at the same time, though this point is difficult to be ascertained with precision. Some of the medicines termed expectorants frequently prove serviceable in the horse by relieving or curing cough and difficulty in breathing, or what is termed thickness of wind; among these are squills and gum ammoniacum.

Experimentations, IN FARMING, should always be conducted on a small scale, but thoroughly enough to be of value; and particular care must be taken not to attribute an effect to the wrong cause. For example, a man turns his horse from a constant stable life into a pasture some time in June; the next day the animal is drooling at the mouth and is sick; the owner forthwith attributes his sickness to clover, while it may have been due to any one of a half-dozen other causes; as, too large a quantity of green stuff; semi-poisonous herbs, or toadstool, taken accidentally in the animal's eagerness to obtain a "square meal" of his more natural food; the development of some ailment which was already in existence in his stall confinement; too much exercise, etc. Next to connection of cause and effect, is a faithful *written* memorandum, from which results can be obtained with mathematical certainty. The almost universal practice is to assert that "experience teaches" so and so, when no pencil and paper account has been kept, and the statistical result often very different from the assertion. For instance, a man will assert that his experience teaches him that potatoes planted in the "dark" of the moon always do better than those planted during the "light of the moon," when another member of the family, perhaps, has been quietly keeping a written memorandum of that man's "experience" from year to year, and he finds no difference whatever, in the average results, between the one time of planting and the other. As a rule, the more vehemently one asserts what "experience teaches," the more sure we may be that he has not kept a written account. Memory is curiously treacherous when it is trusted under the influence of a preadopted belief. We are all inclined to read facts as we do the Bible, as supporting our own creed. Two persons, looking at the same thing, often interpret it differently,—sometimes in direct opposition to one another; and in such a case one will afterward report that he has witnessed a "fact," as supporting his idea, and the other party will also report that he observed the same "fact," as proving the opposite, and "there is no denying *facts*." The "fact" is, the words "fact" and "experience teaches," etc., are very commonly used in the spirit of scoffing. The man who really has facts on his side will be neither vehement nor repetitious. The celebrated old story to illustrate false reasoning from facts is this: An Englishman observed that a Frenchman, who had a fever, ate a red herring and got well, and he so noted it in his memorandum book. Afterward a fellow citizen had the same kind of fever, and he was persuaded to eat a red herring. He died, and the "observer" noted in his book, "Red herring will cure a Frenchman but kill an Englishman!"

Hence the emphasis in our schools and colleges laid on the necessity of training, first how to observe, and secondly how to tabulate in statistical form, and reason out the results. This, indeed, is almost all there is of mental discipline, and we become proficient in it in proportion to our inherited mental capacity and disposition.

It is a common saying that "there are exceptions to all rules;" but a more careful wording of the idea would be, "There are exceptions to most generalizations made by man, but none to any law of nature."

Most experiments in farming, stock-raising, horticulture, gardening and household economy do not have to be purposely instituted as such. A systematic record of the ordinary work is nearly or quite sufficient. Systematic experiments as such should be conducted at the agricultural colleges, as they are indeed established and supported in great part for this express purpose. What devolves upon the farmer is to endeavor to obtain the best results he can, from year to year availing himself of what knowledge the agricultural schools and societies afford him. This information is published by the State in annual volumes for free distribution. This encyclopedia is in a large proportion a classified and condensed alphabetical statement of these reports—the first effort of the kind ever made.

Express Companies are "common carriers," and are bound to carry all merchandise offered them at uniform rates; are liable for the safe delivery of such merchandise, except such damages as may result from the "acts of God" or the public enemy, unless a contract is made exempting them from liability. Usually they are not liable beyond their own lines.

Extracts, FLAVORING, are preparations of vegetable principles obtained either by putting the plants in a solvent, such as water or alcohol, and then evaporating the liquid down to the consistency of honey; or by expressing the juice of plants, and then evaporating. Extracts contain only those vegetable principles that are either held in solution in the juices of the plants themselves, or are soluble in the liquid employed in extracting them, and, at the same time, are not so volatile as to be lost during evaporation. Hence, we find in an extract generally a great variety of substances, as mucilage, sugar, tannin, resin, gluten, etc. If water alone is employed in solution it is called a watery extract; if alcohol or proof spirit, then the product is a spirituous extract. To make a watery extract, the substances are generally boiled in water, the decoction is strained, and then boiled down till it has attained the desired consistence, and, perhaps, gently dried on a stone. If a spirituous extract be required, a tincture of the substance is first made, and this is evaporated gently in a water or sand bath, or a distilling apparatus may be employed, and thus the spirit is saved. In performing the operation of making a watery extract a higher temperature than boiling water must be employed, and yet the evaporation must be effected as quickly as possible by having the evaporating vessel broad and shallow, and set in a water-tub. Some extracts are made by a mixture of spirits and water, it being found that some plants contain both a resin and a gum, the first being soluble only in spirit and the latter in water, as, extract of jalap, or Peruvian bark, etc.

A number of flavoring extracts are in domestic use. These are prepared according to the general principle above set forth. The most common preparations known in domestic economy are, lemon extract, orange extract, extract of rose, cinnamon, nutmeg, ginger, pepper, coriander, vanilla, celery, soup-herb , bitter almond, cloves, mace, thyme, sweet marjoram. The fruit flavors are generally used in the form of essences, and are the essence of pine-apple, strawberry, raspberry, peach, and other fruits. The essences are articles of frequent adulteration, and purchasers should be careful to procure their flavors only from responsible dealers, and buy only the best, even if the cost is considerably greater.

Eye, the organ of vision. It is possessed by all the active species of animals, except the few who live in darkness and do not need it, and in every instance, from its largest size in man and quadrupeds, to its minutest and microscopic form in the smallest insects, it is a museum of wonder, a collection of complicated organizations, a system of intricate and multitudinous adaptations, a mimic universe of the results of design and wisdom and beneficence on the part of the Creator. To describe it fully would require a volume, and to trace all its mechanisms, its adaptations, its chemical relations, and, above all, its evidences of the being and perfections of its Divine Father, might fill volumes enough to constitute a library. We must refer, for general information upon it, to technical works and special treatises, and we feel obliged to restrict ourselves to a few sentences in close connection with the immediate design of our work.

The eye of quadrupeds, though usually somewhat different from the human eye in form, and sometimes widely different from it in appendages, strictly resembles it in structure. The eye of the horse is proportionately larger than that of some other quadrupeds; it is situated less in front and more to the side than in man in order to command a wider lateral range of view; its pupilar opening is elliptical, and has a long axis parallel to the horizon, so as to increase the lateral field of vision, and its edge is provided with a peculiar plum-colored fringe, which is supposed to absorb occasional excesses of light. The horse has excellent vision, and though not a nocturnal animal, can see better in obscure light than a man. His eye, when healthy, is full, clear, dark-colored, and nearly circular, and when eminently good it is comparatively large, yet not over-prominent. But this important organ in the most valuable of domestic animals is so frequently obscured, defective, or totally blinded from disease as always to require close examination on the part of the purchaser of the horse, and special tenderness and care on the part of his owner. If the eyeball is sunk into the orbit, producing a corrugated appearance of the lids, we may suspect latent disease. If a horse shies we should be doubly careful in the examination of these organs, as this habit often arises from defective vision. Some horses, usually with a considerable quantity of white about the face, have what is termed wall-eyes. In these cases the iris is found to be deficient in its natural color, giving a white appearance to it. They are known to be more liable to affections of the eye than those in which this peculiar defect is absent; but certainly it does not increase the beauty of the animal. A horse whose eye exhibits more than a normal proportion of white, has generally a vicious temper. The principal diseases which attack the eyes of horses are amaurosis, cataract, inflammation, ophthalmia and filaria.

The eye of the ox is situated more on the side of the face, more in a situation to command a wide lateral field of vision than even in the horse. "The ox in a state of nature," remarks Youatt, "being exposed to the attacks of ferocious animals, needs an extended field of vision in order that he may perceive the approach of danger from every quarter. He is oftener the pursued than the pursuer, and therefore requires a lateral instead of a somewhat forward direction of the eyes. The eyes are prominent, in order to increase the field of vision; and they are rendered thus prominent by the mass of fat which is accumulated at the back of them. A prominent eye is reckoned as a good point in a beast: it shows the magnitude of this mass of fat, and therefore the probability of fat being accumulated elsewhere. This prominence, however, should not be accompanied by a ferocious or unquiet look; for feeders have agreed that neither the grazing nor the milking beast can have too placid a countenance, or be too quiet or docile in her habits." See Breeding, Cattle and Cow.

CARE OF THE EYES. There are more individuals who ascribe their weakness of sight to a use of their eyes under an insufficient artificial illumination than to any other one cause. In a great many instances this may not be strictly true, but there can be no doubt that faulty artificial light is one of the most productive causes of a certain class of injuries to which the eye can be exposed. The two sources of trouble with the ordinary artificial lights are—first, that they are not pure white, and secondly, that they are unsteady.

The position of light in relation to the body is of great importance. If a shade is used on the lamp or burner (it should, by preference, be of ground or "milk" glass, never of colored glass), the light may stand directly in front of the body and the work be allowed to lie in the light under the shade, which will protect the eyes from the glare of the flame. If no shade is used, the back should be turned to the source of the light, which ought to fall over the left shoulder. The same rule applies in the management of daylight. In this case the light should come from behind and slightly above, and fall directly on the work, whence it is reflected to the eye. It should never fall directly in the face. The light in the room during sleep is also not without its influence. Even the strongest eyes are, after the repose of night, more or less sensitive to the impression of intense light. The eyes must have time to accustom themselves to the stimulus. Attention should be called to the injurious effects that sometimes follow reading on railroad cars. On account of the unsteadiness of a page, reading under these circumstances is exceedingly trying to the eyes and should never be persisted in for any considerable length of time. During convalescence from severe sickness the eyes are generally the last to regain their lost power.

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FAINTING. This is produced by various causes, among which may be named great loss of blood, and in some persons the sight of blood; violent passions of the mind; severe pain and suffering; excessive joy; disgusting sights; fright; excessive eating and drinking; offensive odors; impure and confined atmosphere; and intense study. It is also a symptom of other diseases, particularly of the heart and brain. Persons of weak and delicate constitutions are liable to it from very slight causes. If it occur frequently in a person otherwise apparently healthy, and without any known cause, a diseased state of the heart or brain is to be apprehended.

Treatment. A person who has fainted or swooned should be immediately laid in a horizontal position, the clothes about the chest and neck loosened, and cold water sprinkled freely in the face. If the fainting has taken place in a tight or crowded room, the patient should be immediately removed to where there is plenty of fresh air. The hands, legs, and arms should be freely rubbed. Spirits of ammonia or the salt of hartshorn should be held to the nose. A teaspoonful or two of compound spirits of lavender, with some spirits of hartshorn, is very good, to be taken internally. There should be about four times as much lavender as hartshorn, or in about that proportion. A teaspoonful of No. 6 is also good. It may be diluted with a little brandy, or other spirits. But in a majority of cases, pure air, and a little cold water in the face, are all that will be required.

Persons subject to fainting should avoid all crowded assemblies and places where the air is impure or confined. They should also avoid mental excitement, too much fatigue, and tight-lacing.

Fair. This word, in the olden time, in England, applied as a name to holidays. Fairs, or outdoor fetes, were held in churchyards. Later, the term "fair" was applied to a public sale, where the people gathered at a market town, on fixed days, and exposed cattle, farm products, home manufactures, etc., for sale. Much pastime and carousal was indulged in on these occasions. Under the patronage of the "Highland Society" of Scotland, annual exhibitions of stock, etc., have been held alternately in the large towns of that country for many years. In the United States the term "fair" applies to the annual exhibitions of agricultural societies. There are State, county, township, district, sectional, and national societies and fairs. The first agricultural exhibition, or fair, of England was held in 1723. The first agricultural society ever incorporated in America was that established in South Carolina in 1785, called the Society for the Promotion of Agriculture. Its object included the institution of a farm for experiments in agriculture, and the importation and distribution of foreign productions suited to the climate of that State. Another prominent object was to direct the attention of the farmers to the economies connected with the agriculture of the State, and to enlist them generally in the improvement of their condition.

The society accomplished an excellent work, among other things, that of introducing the cultivation of the olive and the vine into the State. Societies for the promotion of agriculture were always regarded by the planters and statesmen of the South as being of the first importance; and naturally so, for the reason that agriculture always was the dominant, in fact, almost the exclusive, interest there; more than this, however, from the settlement of the country until about 1860, it was confined to special products, as, at first, tobacco, then cotton, and, later, sugar, these, with blooded horses and cattle, comprising the chief sources of wealth of the southern planter. In the earlier history of the South, her clubs and societies were composed of men of wealth and position, and, like the earlier kindred societies of Great Britain, were exclusive in their nature. More recently, agricultural societies in the South have taken on a more popular character, and the last ten years has witnessed a wonderful increase in the number of clubs and similar organizations, which have had the effect to re-awaken interest in this rich and diversified portion of our common country.

The primary purpose of fairs in this country was to promote the advancement of agriculture and the industrial arts. That object has always been real or ostensible. The interest that progressive and thinking men felt in the improvement of farming and manufacturing processes was, no doubt, the motive for instituting annual exhibitions in the country towns, where competition in display should beget emulation in producers. As in all things, money was required to conduct fairs, and men of speculative minds saw an opportunity to handle this money to their own benefit. The fairs of the present time undoubtedly contribute much to the benefit of the farmer, the artisan, and the householder, but it is thought by many who are both wise and interested in the success of agriculture and kindred interests that the later manner of conducting fairs is fraught with abuse and damage. One of these alleged abuses is horse-racing and its accompaniment, betting; another is the show business connected with most fairs—the permission of various itinerant catchpenny affairs, by which the money of the farmer is persuaded from him; the roulette tables, wheels-of-fortune, lifting machines, etc., are deprecated by many. Others decry the scheme of having a programme of amusements, like foot-races, bag races, base-ball games, military displays, balloon ascensions, and the like, as vicious, diverting from the real object, and detracting from the dignity of an industrial exposition. This section of the farming community embraces individuals of the soberer classes, who are intensely practical, and, having no taste for variety and amusement, seek to bring others to their standpoint. They are, no doubt, partly right, and their opinions should have their due weight.

There are persons of the other extreme, who would have the agricultural exhibitions turned into a sort of annual circus and horse-trot, with all the accompaniments of sporting crowds—free liquor, boisterous amusement and reckless folly. The opinions of this class are worthy only of contempt.

A middle class believe that the annual fairs should combine both amusement and profit. While anxious that such expositions should be always a collection of valuable exhibits, so arranged and prized that industrial benefit may thereby result, yet they realize that fairs are designed for all classes of the people; and if an interest in them is to be maintained, and the highest results are to accrue, men, women, and children, old and young, are to find something inside the gates to please and instruct.

Besides, all who have had experience in the management of fairs know that each annual exhibition costs money, and that enough must be taken at the gates for admissions to pay this outlay, or else the association that is responsible for the fair will be in debt. For this reason some programme of entertainment has to be provided to call the people together. If the views of the first class prevail the middle section argues the attendance at the average fair, now numbered by thousands, would dwindle to hundreds, and a depleted treasury would be the result.

Following are some further reflections on the difficulties and abuses of State and county fairs, with remedies, as suggested from high sources:

State Fairs. It has been urged that an evil of great magnitude connected with State exhibitions is the hurry with which the exhibits are collected together, preventing adequate classification, and doing injustice to exhibitors, judges and visitors. In Great Britain and New York, and perhaps other States, the practice has been for some years to have all the entries made and the books closed thirty days before the opening of the fair. A catalogue is also published showing all entries in each department and class, and the names of the exhibitors, and their post-office addresses. These catalogues are offered for sale, and the money from this source generally pays for the publication of the catalogue.

Some of the wisest farmers of the country have given much attention to the question of exciting amusements at State fairs. It is held, probably by the majority; that the State exhibitions, at least, should be kept free from such features. They hold that the great interests attaching to a State show will call together a large number of exhibitors and visitors in any event, and, that if there be a necessity for exciting amusements at county fairs, it does not apply to State expositions. They hold that the care and expense of providing such means of drawing people together are not balanced by the results in dollars and cents; that it distracts the managers from the absorbing and graver purpose they have in hand, and thus the value of the exhibition is impaired.

In this connection horse-racing is made to receive a large share of deprecation. It is pronounced outside the objects of the enterprise, and vicious in the extreme. It promotes the spirit and practice of gambling; it fosters a disposition for reckless gaming, and brings together the sporting fraternity from all quarters, with their habits of drinking and debauchery. New York has banished races from its programme, and the agricultural societies of Great Britain have, despite the racing influence of the higher orders, refused to open their grounds to speeding practices.

The objection is probably true that in the case of State fairs many exciting amusements and spectacles and an unlimited amount of horse-racing are deleterious to the interests of the fairs. The object of State fairs is to bring together a collection of the products of the State—animal, vegetable, mechanical, and, in a measure, artistic, in the greatest possible variety and perfection. This is to stimulate emulation, impart information, and promote progress. It requires grave consideration and hard work on the part of the management. It is only reasonable to conclude that the diversion of the thought and effort of the individuals charged with this work will impair their efficacy. And besides, farmers from different parts of the State, who visit the fair, are not as apt to be benefited by what they see if their minds are captivated by the passage of a frivolous daily pageant. It seems apparent that if the sole purpose of our State exhibitions was that they should be just as replete as possible with valuable exhibits, their character would be raised appreciably.

But the argument of horse-men also deserves consideration. They truly assert that the horse is a product of the farm, and that the roadster and the speedy horse deserve as much notice as the draft animal. They point to the fact that roadsters of speed are always in demand, and command a high price; that the breeding of this kind of stock has become large and remunerative. They ask, not without reason, why their interests should be excluded from State fairs.

This much agitated question will doubtless be settled by a compromise. Horses entered by their owners, and for legitimate purposes of exhibition of speed should always be welcome. The trotting course should always be the arena on which owners can exhibit and test the speed of their favorites. Moderate prizes can be given, as in case of any other exhibit, but the gambling element should be banished from our State fairs. It can hardly be seen how the exhibition of running stock can be of benefit.

Show herds have caused much discontent among ordinary exhibitors. It is the practice of breeders and others to feed and foster a selection of half a dozen cattle, sheep or swine, with which they travel from fair to fair, and sweep the prizes. They enter the herd together and separately, bulls, cows, yearlings, calves, and gather in a large list of premiums. Having been long in the business they are able by well-matured arts to captivate the committee-men and procure prizes in their favor. Regular breeders have but little encouragement to compete against these "professional" exhibitors, and hence the loud complaints and deprecation of fairs as fraudulent and partial.

A cure of this evil has been suggested in this wise: All stock for exhibition should be entered by actual resident breeders or owners. There should also be two general descriptions of exhibition stock—the breeders' and the sweepstakes. The first should be open to breeders only; the second to all, with the provision that they should be entered by the owners only. Different breeds should be shown separately. There should be no general sweepstakes department, where all breeds compete together.

Following the lead of these suggestions there can be no doubt about the improvement of our State fairs.

The proposition to exclude intoxicating liquors from State fair grounds has also been much discussed. Generally the stronger liquors have been banished, but a single beer stand is allowed, which is a privilege that somebody is willing to pay roundly for. The temptation to gather in this revenue is generally omnipotent with most agricultural boards.

The renting of refreshment, amusement and gaming stands on fair grounds is one also of revenue. Where the grounds are ample they can do but little harm. In the matter of refreshments, privileges of this sort are an absolute necessity.

COUNTY FAIRS. When we arrive at the consideration of county, district and local exhibitions, the aspect somewhat changes. There is less dignity attaching to them, and rules that apply to one cannot always adhere to the other. The general object is the same in both. The argument regarding "show herds;" favoritism in awarding premiums; the determination to have a full and praiseworthy exhibition; the plan of having entries close 30 days before the opening of the show; and the suggestions about the division of the breeders' and sweepstakes classes, apply to both State and county fairs. But in questions of amusements, horse-racing, etc., the two are somewhat different.

State fairs are supported by the entire State. Their importance will call together numerous entries and a large attendance in any event. Not so with the county fairs; many of them have hard work to be self-sustaining. It requires careful and judicious, as well as ingenious management, to conduct a successful county fair. The interests connected with them are local. Managers and patrons are neighbors. Bickerings and dissatisfaction are liable to arise. The people are apt to expect more than they realize. The demands upon the management are rigorous and onerous. For this reason they are obliged to furnish the people something that will entertain. This often brings down upon the managers the censure of the sages of the community, and thickens the difficulties of the managers. No wonder that many local fairs dwindle out a sickly existence, and finally die of financial debility.

The first requisite for a good county fair is an ample, convenient and pleasant ground. A natural amphitheater, with rising ground at one side, is the best. Plenty of water and shade are indispensable. Another feature should be ample and convenient stalls, and pens for all classes of stock. This invites exhibitors. Commodious and tasteful exhibition halls, fully weather-proof and tasteful in construction, should be provided. In these, tables, racks and cases should be placed for the use of exhibitors.

A fair-ground is always beautified by an ornamentally constructed floral and art hall. A little effort in filling this with floral displays, miniature landscapes, etc., makes it a point of general attraction. Ample accommodation should be given to the domestic department, and full encouragement to household exhibits. The departments, mechanical and other, where selfish interest is the prompter, will more readily take care of themselves. Liberal premiums should be awarded at county fairs; for it is a fact that wherever this is done, there the fair has been the most successful. Encouragement to art exhibitions and other attractive features should be given.

A late feature of county fairs in some instances has been the awarding of premiums to competitive schools. This is done by a system of lesson papers, and becomes a very interesting and valuable part of the fair.

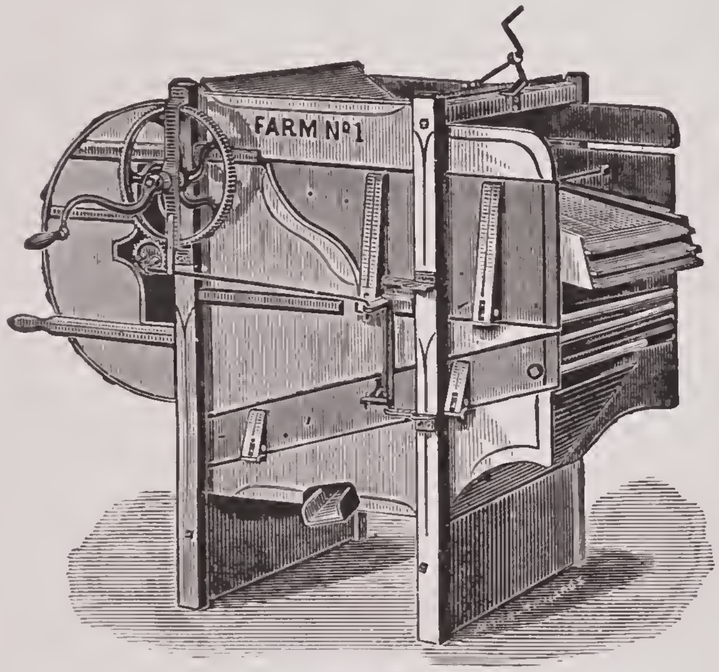
It has been suggested that the small girls be encouraged in sewing by receiving premiums for excellence in this useful art. Anything domestic, such as cookery, model housekeeping, bread-making and the like, should enter into competition at county fairs.

The county fair is the farmer's great annual holiday time, and he who would reduce it to a mere show of farm products is unwise in that he prevents the æsthetic and amusing from entering into the festive occasion, and thus deprives it of half its attractiveness. He also deprives the management of half their revenues. The young people from the farm certainly attend the county fair to be amused as much as profited in the more substantial things of life. If the means of amusement are not furnished on the fair ground they will not attend. The same may be said of two-thirds who visit the fair out of the villages and cities of the county. The necessity therefore seems imperative that amusements be furnished at county exhibitions; but this does not imply that the more important features be neglected.

Fallow, to plow, harrow and break up, as land, without seeding, for the purpose of destroying weeds and insects, and rendering it mellow. The word is also used as an adjective and as a noun.

Fan, of a windmill, is the "tail," or vane, to keep the sails facing the wind.

Fanning-Mill, a mill used for fanning out chaff and other light material from grain, beans, etc. A mill as illustrated in the accompanying engraving should be on every farm. The modern threshers are provided with a fanning mill for cleaning grain, yet a farmer will find more or less service for a good fanning mill.



Fanning-Mill.

The best fanning-mills must not only winnow out all the chaff, but remove every foul seed which may have found its way among the grain. Cockle and chess must be taken from winter wheat, oats from spring wheat and from barley, and most important of all, grass seed must be thoroughly cleaned—clover separated from timothy, sorrel or plantain seed; and timothy from other small seeds.

Farce, in cookery, is a stuffing or mixture of viands, like that used in dressing a fowl; force-meat.

Farcy, a disease of horses similar to mange or glanders. See Horse.

Farding-Bag, the first stomach of a cow or other ruminant animal; the paunch.

Farina (fa-rī´-na or fa-re´-na), the flour of corn or of any starchy tuber or root, as potato, manihot, etc. It is sold at drug-stores and groceries. To prepare it for eating, stir a large tablespoonful of it into a cup of boiling water, in a vessel which is inside a kettle of boiling water; boil 15 minutes, stirring constantly until it is well thickened; then stir in gradually a cup of fresh milk and boil 15 minutes longer; sweeten, if desired, and eat as soon as it is sufficiently cool. Enough can be made in the morning to last all day, as it can be warmed up with a little milk.

Farinaceous Food. Wheat, barley, sago, chestnuts, beans, potatoes, etc., are classified as farinaceous. Farinaceous food, although much recommended for invalids, is often injurious. A weak stomach is frequently made still more feeble by the long and exclusive use of farinaceous food. It should always be combined with a little animal food given either as a solid or in the form of gravy. Of all farinaceous food the best is probably gruel. When passing through a course of farinaceous diet, if the invalid should find a perceptible increase in the clammy or metallic sensation in the mouth, it may be taken as an indication that this diet is enfeebling the stomach, and that a slight change toward animal food must be made.

Farm. Farms have a great variety of both character and objects, and are capable of distribution into many classes. The farms of hot countries differ in the aggregate from those of the cold countries, and at the same time considerably differ among themselves.

SIZE OF FARMS. A controversy has long existed, and has at times been acrimonious and engrossing, as to the comparative advantages of very small farms and very large ones. The most common argument in favor of large farms are, that they call into play large capital, that they command the requisite facilities of both science and art for the proper working of the land, that they afford scope for enterprise and incite the peculiar activities requisite for progressive improvement, that they greatly economize labor and expenditure; and that they evoke both a better and a bulkier produce, and possess a freer and stronger subserviency to the national wealth, and, therefore, to the common well being. The most prominent arguments in favor of very small farms are, that they reward merit, that they encourage industry, that they keep up and multiply the population, that they promulgate a general feeling of manliness and independence throughout the community, that they furnish the best class of men in all subordinate stations of life, and that, in such peculiar circumstances as those of a large part of Ireland, with a crowded population, and without any other general means ot support than the cultivation of the land, they are essential to the prevention of extensive starvation and general misery. Some enthusiastic advocates of the minute subdivision of land have contended that small farms are not necessarily encumbered with any disadvantages whatever, except such as are common to farms of all sizes, that they possess some advantages peculiar to themselves, and that, under almost any kind of treatment, they actually yield a larger produce than if they were consolidated into large farms. But the controversy is in a great degree unmeaning. Either small farms or large ones will produce much or little according as they are or are not worked with energy and skill; and small farms possess just the same adaptation to men of small capital as large farms possess to men of large capital. A controversy about the size of workshops and factories in the world of manufacture would appear to us nearly as wise as the controversy about the size of farms in the world of agriculture. Let interested parties observe what arrangement is most desirable in the circumstances of their own portion of the community; and instead of fomenting discontent and creating disorder by comparing its advantages and disadvantages with those of arrangements in other States or counties, let them do all they can to push all its parts into the grand and rapid current of general agricultural improvement.

Renting Farms. The hiring or renting of a farm is the most serious professional act of the farmer's life, and requires a nice exercise of judgment. A person who wishes to rent a farm must call all his abilities and information into play: he must take a comprehensive and symmetrical view of the numerous circumstances which determine both the intrinsic character of the farm and its relative adaptation to his capital and knowledge; he must examine alike the advantages and disadvantages, and assign to each its due or comparative degree of importance; he must discard both a too solicitous prudence, which doubts every benefit, and too daring courage, which overlooks or lessens every evil; and he must carefully beware of having his choice principally or even partially determined by considerations which are merely incidental, or which do not belong to the real merits or demerits of the farm. It must be obvious to almost every person that the common farmers often lose themselves in deliberating concerning a farm. They have so many mistaken rules of judgment that they often reject farms that soon after make the fortunes of those who hire them. In particular, they are very apt to take one false guide, the success of the last renter. If a man makes a good deal of money upon a farm, or leaves it for a much larger one, numbers will immediately apply, almost without viewing it; but if a renter or two breaks, or is poor, most of the neighbors look down on it without further consideration. They attribute all to the land, and avoid it under an idea that without a reduction of rent the farm cannot be profitable. These notions are absurd in the extreme; for the management of various farmers is so essentially different that success often depends very little on rent. A farmer with a proper sum of money in his pocket hires a farm and thrives upon it; another with one hundred dollars less, hires it and starves. Suppose two farmers of the same means, and living upon similar farms: one manages his land with judgment and spirit, makes all the manure he can, sells no hay or straw, does not injudiciously crop his land, drains his fields, and keeps his fences in good order: this man grows rich; the other, a sloven in these particulars, falls into poverty. These are the circumstances that make one man rich and the other poor; the rent has but little influence. And surely it must be apparent that the succeeding renters, judging of the respective farms by the success of others, are taking as blind a guide as they can possibly fix on.

One important consideration is the quality and condition of the soil. The mere color and mechanical texture of the land, or the general resemblance of its appearance to other lands with whose power of production the party is acquainted, are very insignificant circumstances, and are quite as likely to mislead the judgment as to direct it. Both the elementary constitution of the soil and the precise condition into which recent cultivation has brought it, ought to be ascertained, the former by analysis, and the latter by searching through courteous inquiry into the method of tillage which has been practiced, the course of rotation which has been pursued, the kind of manure which has been applied, and the species and comparative bulk of the weeds which have been encountered. A soil of very inferior constitution may be very similar in both color and comminution to a soil of very superior constitution, and a soil of mediumly fertile powers, in a state of good health, will for a number of years to come yield more valuable crops than a soil of very highly fertile powers in a state of rankness from mismanagement or exhaustion.

Another important consideration is the compactness of the farm, and the convenient distribution of its enclosures. Every farm, in order to be managed with ease and economy, or without an irritating and wasteful expenditure of daily labor, requires to be free from the intrusions of any other man's ground, and free also from intricacy, angularity, and unequal distribution of its own parts. When the fields of a farm are mutually straggling and disjointed, the general business of it is never collectively under the eye; all the operations of tillage and after culture involve waste of time and labor, the equal distribution of manure is difficult and perhaps impossible, the maintaining of fences is very troublesome and not a little expensive, and depredations of all sorts by both men and brutes are comparatively frequent and disastrous.

Another important consideration is the nature of the fences, the condition of the gates, and the yearly expense which will be requisite for keeping all the enclosures in a state of efficient repair. Some fences are so incompetent as to entail enormous damage from exposure or depredation; some are so unsuitable, or so positively mischievous, as to impoverish the fields, embarrass the tillage, annoy the flocks, counteract much of the beneficial effect of draining; and some, though otherwise unobjectionable, may require from the renter, for their repair or maintenance, an amount of expense which probably may both surprise and distress him. The nature and state of the fences is a very important item, insomuch that it alone is sufficient to render some farms unprofitable for renting which otherwise would be very remunerative. See article on Fence.

A fourth important consideration is the situation of the farm with reference to the public market, to sources of mineral manures, to sources of fuel, to roads and other public facilities of conveyance, and to the communication of neighboring grounds. A greater distance from the public market than a majority of farms of similar character, involves the cost of carrying produce the additional distance, and subtracts the amount of that cost from the net price which the renter obtains for his produce.

Ample and free facilities of conveyance, in the form of roads, bridges, canals and railways, exert so mighty an influence as speedily to raise a starving and barbarous agricultural district to a condition of plenty and refinement; and limited or ragged means of communication from any one farm to the rest of the country, particularly if these means consist of bad roads, repress enterprise, shut out ameliorating influences, and occasion great wear of vehicles, excessive jading of horses, much irritation of farm help, great, wasteful expenditure of strength, and an incredibly large aggregate of incidental or general expense.

A fifth important consideration is the character of the farming or the condition of the farm buildings.

A sixth important consideration is the kind and amount of restriction imposed by the conditions of the lease. The conditions exacted by some landlords, especially when viewed with specific reference to peculiarities of soil, and to improved methods of cultivation, are incompatible with some of the best professional interests of a farmer, and even with the practice of sound principles of husbandry.

A seventh important consideration is the amount of rent. This is, in a great degree, controlled and determined by the other considerations, yet it must be separately viewed, and both minutely and comprehensively examined. The evils of an exorbitant rent are too obvious to require mention, and have been too often and dismally exemplified to need illustration. Four highly controlling elements over rent are the quality of the soil, the duration of the tenure, the stipulations of the lease, and the aggregate of all sorts of current and professional expenses; but another controlling element, perhaps quite as high and yet far from being so obvious, is the amount of capital to be invested in the cultivation.

An eighth important consideration, immediately dependent on the preceding, is adaptation of the size and capacities of the farm to the amount of capital to be employed in its cultivation. Many a renter is poor, and maintains a severe struggle upon a large farm, who might live in ease and comfort, and even acquire a considerable property upon a farm of less extent. A man who possesses less capital than the full stocking and free working of his farm require, becomes embarrassed at the very outset, and passes through a constant series of varied and harassing difficulties; he lives in penury, in anxiety, and in hard labor; he keeps fewer cattle and accumulates less manure than the state of his land demands; he overworks his horses, and either neglects or abuses a portion of his fields; he sells his produce in any state of the market, and for anything it will bring, and in the first season of poor crops or incidental misfortune, he either becomes insolvent or passes through an ordeal most perilous to both his credit and his health.

SELECTION OF A FARM is a most important question to be considered by any man who proposes to begin farming, or one who expects to change his location. Perhaps he has been a renter and expects to go into another district and become the owner of a tract of land. It is much better, when possible, for a man to own the farm he tills than to rent, even though he can buy but a small one and not pay cash down for it. The man who owns his farm, though illy improved and meagerly provided with implements, is much happier than he who expends his force on another man's land. The thought that he must leave at the owner's bidding, the improvements, associations, the conveniences and all that he has brought around him, perhaps just at the age or condition of health when he is least able to encounter the fatigues and embarrassments attending the moving and making of a new home, is an ever-present specter. In the selection of a location health is the first thing to be sought; the quality of the soil, surroundings, etc., are after considerations. Before making the purchase of a farm upon which one expects to live, he should ponder well over features in any way connected with it. Remember you are selecting a home—a spot where you will rear your children, expend your life-forces, and pass from earth, leaving the harvests you have sown to be garnered by others. In thus purchasing a farm, observe the following rules and you will be enabled to select a place that will suit you, and where you may live happily and prosperously:

Always avoid a district known to be unhealthful, no matter how cheap the land may be.

Determine in advance what kind of farming you will follow, and seek a soil to suit. If you are going to make a speciality of any single crop, as corn, wheat, sugar-cane, rice, fruit, etc., read up well, that you may be posted as to the nature of the soil, climate, etc., required, and as to the most desirable location of such lands. If you are going to engage in stock-raising, then seek a locality possessing all the requisites, and where stock has been successfully raised by others. But if you are to engage in "mixed farming," there are few townships in the country where suitable soil can not be found. It is true there is poor land in almost every county of every State in the Union, and rich land as well; hence care must be observed, or disappointment will follow.

By all means, if possible, see the land yourself upon which you would make a life settlement, before purchasing. Remember, such a settlement is fraught with vital interests—interests you yourself understand better than anybody else. In examining a piece of land you think of purchasing, if a stranger in the locality, learn all you can from neighboring farmers. Ascertain the cost of labor, the quality and size of the crops they raised last year and the year before, how much manure and other fertilizers they use, and many other things which will readily suggest themselves to the wide-awake man, seeking a permanent home for himself and family.

Ascertain what are the present and prospective facilities for furnishing a school education for your children, and social enjoyments for your family; also, regarding religious meetings and privileges. They are important items in building up happy and contented homes, and which have to be taken into consideration, particularly in the sparsely settled districts of the West and South.

Look out for pure water on the land you buy, both for family and stock purposes. An inexhaustible spring or small stream upon a farm is almost indispensable, and adds largely to its value.

Do not forget to inquire how far it is to the nearest saw and grist mills, for you will want lumber for building houses and fences, and wheat and corn ground for family and animal use.

Facilities for marketing your produce, too, must be taken into consideration, as it is a subject of no little importance. How far it is, by wagon road, to the nearest market town or city, the distance to the nearest railway station, the probable construction of other railroads in the vicinity, if upon a navigable stream or body of water, the running of boats, are all points to be investigated in purchasing a farm, or land out of which you propose to construct a farm.

Examine the soil and subsoil upon every square rod of the contemplated purchase, that you may know exactly what you are buying. Satisfy yourself thoroughly that it will produce what you desire to raise, or that you can make it so produce by the use of fertilizers, etc. If the soil is naturally thin and unproductive, while so much good land "lies out of doors" in this country, do not touch it for general farming purposes, though it may do for special farming.

It is better to buy a farm much run down and out of repair, provided you pay only its present value, than to purchase one with improvements which do not suit your purpose; for, depend upon it, the changing and altering into what you do require will be a source of annoyance for years. In other words, it is better to pay $40 an acre for a place that $40 more will make just what you want, than $80 for one which will never exactly suit you.

See to it that the land has a clear, sightly spot upon it for the dwelling-house and yard—a site which can be made beautiful by means of trees, flowers, shrubbery, etc. For the sake of wife and children, as well as the cash value, if you should desire to sell out afterward, do not overlook this suggestion.

Count your money and then invest only a portion of it in land, reserving sufficient for improvements, implements, and machinery for its successful cultivation.

Buy but few acres, and pay for them, if you have but limited means, rather than go largely in debt and run the risk of losing all. One small farm paid for is worth more than a large one only half paid for, unless you are sure of your ability to meet obligations. Debt, with ever-growing interest, is the nightmare of far too many farmers in this country. Forty acres of land thoroughly and intelligently cultivated will put more money in the owner's purse than two or three times that amount "skimmed over" in a slovenly, hurried manner. System and thoroughness in all things apply most emphatically to farmers; and if the farm is too large for the farmer and his means, many things have to be neglected, whereby he loses money. Therefore, it is better to purchase a few acres at a time, bearing in mind that as your means will allow, land adjoining your farm can be purchased, and thus you will gradually, but safely and surely, enlarge your domain.

Consider the proposed purchase in the light of a cash investment. Will it produce sufficient to pay fair interest upon your money, not only that invested in the land directly, but in improvements, machinery, etc., thereafter to be expended? Unless it will do this, besides yielding a fair profit on the labor of care and cultivation, do not invest. It won't pay. Consider, also, the prospects of a material advance in value, leaving the improvements you make out of consideration. All things considered, what will the land be apt to be worth five, ten or twenty years from now? More money is sometimes made through such advance than from "hard knocks" on the farm. Remember you are buying not only in your own interest, but in that of your children, and buy so as never to regret it, for discontent, dissatisfaction and partial failure follow regret.

As circumstances may arise making a future sale of your farm desirable, it is perhaps well in selecting and improving land to bear this possibility in mind. Indeed, the spirit of speculation is so strong in the make-up of some men that this idea forms about the only incentive to action. It is commendable when not carried to extremes. In general, it is better not to consider the question of selling at all unless you have bought an exhausted farm and buy for the purpose of building up and then selling. Men who intend to follow farming as an occupation should look upon their calling more from the stand-point of living than a mere occupation. Do not consider money invested in improvements in the light of the selling value they will add to the farm so much as with reference to the annual return they will bring in health, economy, comfort, convenience or fertility. Consider the farm a part of yourself and cherish it accordingly.

Farm Buildings: see Residence, Barn, etc.

Farm Accounts, a regular arithmetical record, or systematic and daily course of book-keeping, of all the pecuniary affairs of the farm. See Book-keeping.

Farmer's Calling: see next article.

Farming, the art of cultivating the ground for the production of food for the support of man. In its broad sense, farming embraces all that pertains to the working of the soil, and obtaining sustenance and clothing therefrom, whether it be from the cereal grains, pasturage, hay, the herding, feeding and fattening of animals; all that relates to the making and applying of manures, the draining, and in fact to all which goes to increase the productive capacity of the soil. Farming may properly be divided into two great divisions, that which relates to the farm proper, and that which relates to the forest, the orchard, and the garden. The former is termed husbandry, the latter horticulture. Husbandry is divided into several departments: the cultivation of the farm crops, as grass, grain, etc., stock breeding and feeding and dairying. As the country develops, these subdivisions become more widely separated. Many farmers have their specialty, some turning their attention exclusively to stock, others to grain, while some are engaged solely in the dairying business, or even in the butter, cheese or milk department of the latter subdivision.

Horticulture, the second great division of agriculture, embraces pomology, or that which relates to the orchard; arboriculture, or that which relates to the planting and care of trees and the rearing and caring of groves, forests and wind-breaks; vegetable gardening, or the cultivation of plants for culinary use; floriculture, or the cultivation and the care of flowers in the garden, conservatory, greenhouse and hot-house; landscape gardening, or all that pertains to the ornamentation of the home, public and private parks.

Farming, as a vocation, dates back beyond any other in the history of the world. After God had created the world and fitted it for the occupation of man He gave him directions to dress and to keep the beautiful garden in which he was placed. Then we read of Cain tilling the soil and Abel keeping the sheep. Thus we see the first inclination of man was to develop the resources of nature, and from the beginning of the world's history to the present time there has been a larger portion of the human family engaged in this calling than in any other. All rely upon the faithfulness, energy and enterprise of the farmer to be supplied with their daily food and the clothing they wear.

Traditional history traces man back to the time of the deluge. After that catastrophe, man seems to have recovered himself in the central part of Asia, and to first have attained to eminence in arts and government on the alluvial plains of the Nile. Egypt colonized Greece, Carthage, and some other places on the Mediterranean sea; and thus the Greeks received their arts from the Egyptians, afterwards the Romans from the Greeks, and finally the rest of Europe from Rome. Such is the route by which agriculture spread over Europe; how it may have reached the eastern countries of India and China is less certain, though from the great antiquity of their inhabitants and governments, it appears highly probable that arts and civilization were coeval there, or, if not, that they traveled to the east much more rapidly than they did to the west.

The early history of man in America rests on very indistinct traditions; their arts and civilization do not seem of such antiquity as in Asia; in North America they are of very recent introduction; but of the agriculture of either division of that continent and of India and China we shall attempt little more than some sketches of the modern history, and its present state. The history of agriculture among the nations of what may be called classic antiquity, is involved in impenetrable obscurity. Very few facts are recorded on the subject previously to the time of the Romans. This enterprising people considerably improved the art, and extended its practice with their conquests. After the fall of their empire it declined throughout Europe; and, during the dark ages, was chiefly preserved in the estates of the church. With the general revival of arts and letters, which took place during the sixteenth century, agriculture also revived,—first in Italy, then in France and Germany; but it flourished most in Switzerland and Holland; and finally, in recent times, has attained its highest degree of perfection in Britain. The modern agriculture of America is copied from that of Europe; and the same may be said of the agriculture of European colonies established in different parts of the world. The agriculture of China and the native agriculture of India, seem to have undergone no change for many ages. Such is the outline which we now proceed to fill up by details, and we shall adopt the usual division of time into the ages of antiquity, the middle ages, and the modern times.

The world, as known to the ancients, consisted of not more than half of Asia, and of a small part of Africa and Europe. During the inundation of the deluge, a remnant of man and of other animals is related to have been saved on the top of the high mountain of Ararat, near the Caspian sea, and when the waters subsided, to have descended and multiplied in the plains of Assyria. As they increased in numbers they are related to have separated, and, after an unknown length of time, to have formed several nations and governments. Of these, the principal are those of the Assyrian empire, known as Babylonians, Assyrians, Medes and Persians in Asia; of the Jews and the Egyptians chiefly in Africa; and of the Grecians, chiefly in Europe. Least is known of the nations which composed the Assyrian empire: of the Jews more is known of their gardening and domestic economy than of their field culture; the Egyptians may be considered the parent nation of arts and civilization, and are supposed to have excelled in agriculture; and something is known of that art among the Greeks. The authors whose writings relate to the period under consideration are few, and the relations of some of them are very contradictory. The earliest is Moses, who flourished B. C. 1600; Herodotus and Diodorus Siculus, who wrote more particularly on the history and geography of Egypt, lived, the former in the fifth and the latter in the sixth century B. C., and Hesiod, the ancient Greek writer on husbandry, in the tenth century preceding our era.

Estimating the writers of antiquity on these principles, they may be considered as reaching back to a period 1,600 years before our era, or nearly 3,500 years from the present time; and it is truly remarkable that in the Eastern countries the state of agriculture and other arts, and even of machinery at that period, does not appear to have been materially different from what it is in the same countries at the present day.

Property in land was recognized, the same grains cultivated, and the same domestic animals reared and employed; some led a wandering life and dwelt in tents like the Arabs, and others dwelt in towns or cities, and pursued agriculture and commerce like the fixed nations. It is reasonable, indeed, and consistent with received opinions, that this should be the case; for, admitting the human race to have been exterminated at the deluge, those who survived that catastrophe would possess the more useful arts, and general habits of life, of the antediluvian world. Noah, accordingly, is styled a husbandman, and is said to have cultivated the vine and made wine. In little more than three centuries afterwards Abraham is stated to have had extensive flocks and herds, slaves of both sexes, silver and gold, and to have purchased a family sepulchre with a portion of territory around it. Isaac, his son, during his residence in Palestine, is said to have sown and reaped an hundred fold. Corn seems to have been grown in abundance in Egypt, for Abraham, and afterwards Jacob, had recourse to that country during times of famine. Irrigation was also extensively practiced there, for it is said the plain of Jordan was watered everywhere, even as the garden of the Lord, like the land of Egypt. Such is the amount of agricultural information contained in the writings of Moses, from which the general conclusion is that agriculture, in the East, has been practiced in all or most of its branches from time immemorial. The traditions of other countries, however, as recorded by various writers, ascribe its invention to certain fabulous personages, as the Egyptians to Osiris; the Greeks to Ceres and Triptolemus; the Latins to Janus; and the Chinese to Chin-hong, successor of Fo-hi.

Thus we see in the very morning of the labor of man on earth agriculture, in some of its subdivisions, engaged the attention of the great men. Even the most savage tribes have to some extent been farmers. They gathered seeds and nuts for food, and many till the soil in a crude way for the production of roots and grain. Civilization has always carried with it a higher development of agriculture. The civilization of the nineteenth century finds the art of agriculture as far advanced as any of the sciences and arts, and she has given to the world as great men as came from other walks of life.

As men multiplied upon the face of the earth it seemed necessary that some should engage in other callings, and great cities and manufacturing centers were the outgrowth; yet agriculture has continued to hold the most prominent place among the industries of the world. The earliest recorded history of farming, aside from those mentioned in the Bible, is from inscriptions and hieroglyphics upon the ancient tombs of Egypt. It is very probable, however, that even the Egyptians received the rudiments of her civilization from China. An ancient monument in Asia Minor shows a plow and yoke, supposed to be the oldest known, made wholly of wood, the natural crook of a tree. The ancient Egyptians carried the cultivation of the soil to a high state. They had some knowledge of the art of manuring, the value of rotation, and knew something of horticulture. The Carthaginians considered agriculture to be the most aristocratic of all callings, and the kings, princes and nobles were among the most active cultivators of the soil. When the Romans finally subdued and laid waste the land, the only books which they deemed worthy of preservation, it is said, were 28 volumes of manuscript relating to agriculture.

As above mentioned, perhaps China was the first nation to make any great advances in developing the wonderful resources of nature. Before the days of the reign of Solomon, and the building of the great Jewish temple they nurtured the delicate silk-worm; while Europe lay slumbering in the gloom of the dark ages they performed one of the most wonderful works of the world in the building of the great wall around their kingdom. A district near Shanghai has been tilled for countless generations, yet it is termed the Garden of China. In Greece agriculture flourished a thousand years before the dawn of the Christian era. The agricultural literature of the Greeks, and their knowledge of the art, were comparatively extensive and eminently practical. Their soil was inferior and much of it had to be reclaimed from sand-banks, morasses and swamps, making successful farming more difficult, and, therefore, requiring a greater knowledge of all its different departments. Agriculture was greatly esteemed by the Romans. The most illustrious senators of ancient Rome, during time not occupied with public affairs, applied themselves personally to agriculture. We are told that Cincinnatus left his fields to serve as Dictator of Rome, and Regulus left the Roman Senate to care for his farm. Great men wrote works on agriculture. The Emperor Constantine made a valuable compilation of these works, and after conquering the Saracens and Arabians, fixed his attention upon agriculture as the surest basis of his country's prosperity.

The Romans' love for this pursuit made them careful and scientific, and their crops were large. Devotion and profit mingled. Pliny claimed that the soil loved to be tilled by the hands of men. He states that 400 stalks of wheat, grown from a single grain, were sent to the Emperor Augustus, and 340, also from one seed, to Nero. That agriculture is the foundation of all prosperous nations is abundantly tested by history. During the golden age of agriculture, when eminent men themselves held the plow, the Roman Empire flourished, becoming the mightiest on the globe; but when its agricultural interests were intrusted to menials, and the nation came to rely upon the production of conquered provinces, the zenith of its glory was passed, and dissolution speedily followed. Countless hordes swept down upon it from the North, and the once powerful empire fell never to rise again.

The history of agriculture from the fall of the mighty Roman Empire until the present century is as varied and interesting as the history of man during those centuries.

In the ages of anarchy and barbarism which succeeded the Roman Empire agriculture was almost wholly abandoned. Pasturage was preferred to tillage, because of the facility with which sheep, oxen, etc., could be driven away or concealed on the approach of an enemy. The conquest of England by the Normans contributed to the improvement of agriculture in Great Britain. Owing to that event, many thousands of husbandmen from the fertile and well cultivated plains of Flanders and Normandy, settled in Great Britain, obtained farms, and employed the same methods of cultivating them they had been accustomed to use in their native countries. The implements of agriculture at this period were similar to those in common use in more modern times. The various operations of husbandry, such as manuring, plowing, sowing, harrowing, reaping, threshing, winnowing, etc., are incidentally mentioned by the writers of those days, but it is impossible to collect from them a definite account of the manner in which these operations were performed.

From the Restoration down to the middle of the eighteenth century, agriculture remained almost stationary. Immediately after that period, considerable improvement in the process of culture was introduced by Jethro Tull, a gentleman of Berkshire, who began to drill wheat and other crops about the year 1701. Great Britain is perhaps more indebted to Lord Bacon than to any of his contemporaries for the impetus which agriculture received in his day. Arthur Young is justly celebrated for his labors in behalf of agriculture. He traveled extensively over Europe to observe the various methods of tillage which prevailed, and is said to have edited nearly one hundred volumes relating to the profession. Sir Humphrey Davy was another benefactor of husbandry. It was the result of his experiments which led to the establishment of agricultural chemistry as a recognized branch of modern science.

At the close of the seventeenth century, America was only just beginning to be settled by colonies, widely separated along the Atlantic coast. The interior was one unbroken primeval forest, until the great prairie region of the West was reached, which, after passing west of the Mississippi river, gradually merged itself into what is now known as the great plains, east of the Rocky mountains. All this great country was then, and continued to be until long after the Revolutionary war, inhabited by wild Indians, more savage and cruel than the wild beasts. But the fertile soil and the great diversity of climate and its great natural water systems, soon attracted emigration from all arts of the civilized world. They have continued to flock in from year to year, until now they have occupied much of the available land, in connection with our own hardy pioneers, from the Atlantic to the Pacific. It is true that many large and fertile tracts are yet remaining, but a very few years more will find these all settled. Of the agriculture of the early part of the present century we find the agricultural implements and farming operations of the United States, in most particulars, were very similar to those of Great Britain. Circumstances, however, required variations, which the sagacity of the American cultivator caused him to adopt, often in contradiction to the opinions of those who understand the science better than the practice of husbandry. In Europe, land was dear and labor cheap; in the United States, the reverse was the case. The European cultivator was led, by a regard to his own interest, to endeavor to make the most of his land; the American cultivator has the same inducement to make the most of his labor.

The climate and soil of the United States are adapted to the cultivation of Indian corn, which the climate of Great Britain is not. This entirely and very advantageously supersedes the field culture of the horse-bean, one of the most common fallow crops on that island. Root husbandry, or the raising of roots for the purpose of feeding cattle, is likewise of less importance in the United States than in Great Britain. The winters are so severe in the northern section of the Union that turnips can rarely be fed on the ground, and all sorts of roots are with more difficulty preserved and dealt out to stock in this country than in those which possess a milder climate. Besides, hay is more easily made from grass in the United States than in Great Britain, owing to the season for hay-making being generally more dry and the sun more powerful. There are many other circumstances which favor the American farmer and render his situation more eligible than that of the European. He is generally the owner as well as the occupier of the soil which he cultivates; is not burdened with tithes; his taxes are light, and the product of his labors will command more of the necessaries, comforts, and innocent luxuries of life.

In relation to the difficulties experienced in advancing agricultural art in the United States, it is well known that the earliest settlers found the country a wilderness, with many varieties of climate and soil, of which they were entirely ignorant, and to which the knowledge they had obtained in their mother country did not apply. Thus, they had to contend with the innumerable obstacles, such as the wilderness of nature, their ignorance of the climate, the hostility of the Indian, the depredations of wild beasts, the difficulty and expense of procuring seeds, farming implements, and superior stock. These various difficulties are quite sufficient to explain the slow progress they made in the way of improvement. For many years agriculture was in an exceedingly backward and depressed condition. Stocks and tools were poor, and there were obstacles and prejudices against any innovations in the established routine of practice. This state of things continued for many years with very little change.

No real efforts mere made to improve farming until after the Revolution, when a more settled state of the country and the gradual increase of the population began to impress the intrinsic importance of the subject upon the minds of a few enlightened men. They sought, by associated effort, to awaken an interest in the subject, and spread abroad valuable information. The South Carolina Agricultural Society was established in 1784, and still exists, and the Philadelphia Society for the Improvement of Agriculture, established in the same year, and a similar association in New York in 1792, incorporated in 1798, and the Massachusetts Society for the Promotion of Agriculture, established in 1792, were active in their field of labor, and all accomplished important results. The correspondence at this period between Sir John Sinclair and Washington shows how anxious was the father of his country to promote the highest interests of the people by the improvement of agriculture. But all the efforts of the learned and all the investigations of the scientific prove comparatively unavailing unless the people themselves, the actual workers of the soil, are prepared to receive and profit by their teachings. Many years elapsed before the habit of reading became sufficiently common among the masses of the actual tillers of the soil to justify an expectation that any profit would arise from the annual publication of the transactions of the several societies. The improvements proposed fell dead upon the people, who rejected book farming as impertinent and useless, and knew as little of the chemistry of agriculture as of the problems of astronomy. Such has been the increase of intelligence and the growth of liberal ideas among all classes of men during the last half century, both in this country and Great Britain, that we, at this distance of time, can with difficulty realize the extent of the prejudices which blinded the eyes of the people of those days. The farmer who ventured to make experiments, to strike out new paths of practice, or to adopt new modes of culture, subjected himself to the ridicule of a whole neighborhood. For many years, therefore, the same routine of farm labor had been pursued in the older settlements, the son planting just as many acres of corn as the father did, in the old of of the moon, using the same number of oxen to plow, and getting in his crops on the same day, after having hoed them the same number of times as his father and grandfather. So all farm practices were merely traditional; no country or town agricultural societies existed to stimulate careful effort through competition. There were no journals devoted to the spread of agricultural knowledge, and the mental energies of the farmer lay dormant.

The stock of the farm was such as one might expect to find under such circumstances; the sheep were small and ill cared for in the winter, and even the size of cattle generally was but little more than half that of the present time. The value of manures was little regarded; the rotation of crops was scarcely thought of; the introduction even of new and labor-saving machinery was sternly resisted and ridiculed by the American farmers of that day as well as by the English laborers. It was long before the horse-rake was brought into use in opposition to the prejudices it encountered. It was equally long before the horse-power threshing-machine was adopted. In some parishes of Great Britain, even so late as 1830, the laborers actually went about destroying every machine they could find. Now, on the contrary, the use of the flail is a drudgery to which very few are willing to submit, and steam-power has in many instances been substituted for the horse, while new and improved implements of all kinds are sought to an extent unprecedented in the history of agriculture. Changes are gradually made everywhere, and the success which attends the introduction of new implements disarms prejudice.

Within the last half century, chemistry, the indispensable handmaid of agriculture, has grown with great rapidity, and in each new discovery some new truth applicable to practical agriculture has come to light, while willing experimenters have labored in the field to prove the truth or falsity of the theories proposed, and thus the well-established facts from which the science of agriculture is derived, and the sound theories deduced from these facts, are constantly increasing in number. The substitution of animal for manual power, and yet more, the saving of animal power by the substitution of natural and mechanical forces, are the surest indications of improvement. From the changes which have grown up in these respects, and from the more constant use of chemical analysis to determine the qualities of soils and manures within the last fifty years, we may safely assert that the progress made during this period, or within the last twenty years, is wholly unparalleled.

Turning now from this glimpse of the history of agriculture, we wish to make a few practical observations, such, we hope, as will be adapted to the farmers of this day. There is no art which is practiced by man which includes a greater variety of operations or involves a greater amount of scientific principles than farming. No tradesman or professional man, with one or two exceptions, requires more training or a larger amount of technical knowledge than the farmer. None possesses equal facilities to him to turn a liberal education to an excellent practical account. Agricultural operations present a wider field for inventive genius and scientific research than any occupation allotted to man. Farming stands at the head of human arts, both in its antiquity and usefulness. It is the source of wealth and existence. Every material thing except air comes from the earth. The farmer who does not realize the importance and greatness of his calling, who is unwilling to acquire the knowledge necessary to success as do professional men, artisans, etc., in fitting themselves for their profession, is out of his sphere and should seek another vocation. Farming is both a science and an art, demanding knowledge to successfully cope with its subtle and sublime, intricate and important problems.

The farmer should have a thorough acquaintance with the plants and animals capable of ministering to human comfort. He should have a fair knowledge of botany, that he may interpret the silent language of the vegetable world around him; that he may become acquainted with each plant with which he deals, knowing its peculiar necessities, and the various methods employed to improve and care for it, thus obtaining the greatest returns from the smallest outlay of labor and money. In accomplishing this he deals largely, also, with chemistry, whether conscious of it or not. By this beautiful and interesting science the mysteries attending the transition of plant-life from inert matter to buds, leaves, stems, flowers and fruits are made intelligible. A farmer may raise corn and hogs with some profit, though ignorant of the why or the how.

Every business must be learned, and the more thoroughly the better. The earlier the farmer understands the manifold changes constantly occurring around him, the earlier will his granaries be filled. Some knowledge of chemistry and botany are as essential to him as arithmetic and writing, and pays in dollars and cents better than money at interest.

To be a good farmer now requires more than mere unenlightened, patient drudgery. The calling demands knowledge, constant study, patient experiment, and tireless industry. The farmer feeds the hungry of all classes. He deals in commodities which must be purchased. His income is not dependent upon the caprice of fashion. He is the independent man of the age.

As between the farmer and the importer, or jobber, or manufacturer, or merchant in specific lines of trade, the latter classes have but a few leading points to consider, such as the probable demand or supply, while the farmer must not only take these into account, but also all the variations of soil, adaptability of crops, vicissitudes of climate, weather, etc. Hence, to be a successful farmer requires a wider range of knowledge, better reasoning—in short, better trained mental faculties than any of the other callings named above.

This is literally true, and a popular fallacy to the contrary is responsible for the limited success of the mass of farmers, and the low estimate of their calling, not only by others but by themselves and by their sons and daughters.

We are not arguing that every farmer should necessarily be highly educated mentally, but we do claim that the more knowledge any farmer acquires by reading about his business, by study and observation, and the more he trains and develops his thinking and reasoning faculties, the better will he forecast and plan for the future, and the more successful will he be. In this view of the subject reading and study will pay the farmer even more largely than those in most other business pursuits.

Every book or journal he reads brings him something of the thoughts, experiences and observations of others. These are often of direct practical application to his own work; and if not, they at least increase his general knowledge, stimulate thought, and strengthen his ability to reason well, and indirectly at least, pay a hundredfold.

A formidable drawback on the comforts and attractions of country life exists in the drudgery to which farmers' wives and daughters are subjected in boarding and lodging a number of hired men. Farmers who are in comfortable circumstances as to property, often compel the women to work early and late in feeding these men, and many have been thus reduced to a condition but little better than slavery. To them rest never comes; through the week days and on Sunday the same ceaseless round of cooking, and the many labors connected with it, must be submitted to, and more than a thousand meals must be annually prepared for the men, who have their seasons of labor and of rest. The wife of a man who owned 700 acres of beautiful land told us, in her worn-down and premature old age, that she had cooked fifty tons of food, by careful estimate, for the hired men who performed the labor of the farm. But the labor alone is not the only drawback. The rooms of the house are occupied, and the privacy and repose which women ought to enjoy, at least part of the time, is not to be found. Farmers' daughters see the contrast between their condition and that of wives and daughters of mechanics and tradesmen, and they resolve not to continue in such a life of discomfort by marrying a young farmer. This is a silent but powerful influence operating all through the country to a greater or less degree, and effecting a wide-spread injury to agriculture.

The average Western farmer toils hard, early and late, often depriving himself and family of rest and sleep—for what? To raise corn. For what? To feed hogs. For what? To get money with which to buy more land. For what? To raise more corn. For what? To feed more hogs. For what? To buy more land. And what does he want with more land? Why, he wishes to raise more corn—to feed more hogs—to buy more land—to raise more corn—to feed more hogs—and in this circle he moves till the Almighty stops his hoggish proceedings.

DOING FARM WORK EARLY. The soil must always be the first object of the farmer's attention. Any advantage of loss here will be felt, not only for the season, but through the farmer's life, as it is so much cumulating value made or lost. He must begin his work as early in the spring as possible, as he has no time to lose. Weeds begin their growth at once, and these can never be subdued so well as when they first appear, or earlier. Some even put forth before the soil is dry enough to work, on undrained clay, showing the advantage of a drained soil, where the work may be commenced with the starting of the weeds on land intended for grain by early sowing, harrowing well, and if need be, cultivating the land, which gives the grain the start of the weeds; and the land being good, the chances are it will keep the start, shading the ground and smothering the pest. It is also a safeguard to some extent against the drouth, which often occurs, and is sometimes hurtful. All this can be done only when the crop is put out early. The yield in general will then be better, the straw brighter and the berry sounder. All spring grains will bear early sowing, which means early harvesting, thus distributing the work well, favoring also seeding down, which is always risky if delayed.

All land intended for spring sowing should have its surface worked early to keep down the weeds, the benefit to the soil in improved texture and fertility more than paying for the labor. Keep the harrow and cultivator going, and see that there is no lack of implements and that they are of the best kind. Money here is well laid out; only keep the implements in use.

Where manure is needed, it is always best to apply it in the fall or winter on plowed land intended to be sown in the spring. This makes the finest of seed beds. Or it may be applied in the spring if done early and spread at once, so the spring rains may wash the strength into the soil instead of losing it at the barn. It is well, as soon as the weather gets warm, to lay open the manure piles so as to get them thawed for early application. The manure made during snowy winters is better than usual, as the severe and continued cold weather largely saves the liquid portions from loss. Pains, therefore, should be taken with the manure to get it on the land as early and as evenly as possible. There will then be a good start of the grain, even if the weather is not so very favorable. Once well started in such soil, it will grow on. It is such soil, if quite mellow and even, that should be seeded latest and the smoothing harrow passed over to cover the seed and still further fine and even the soil. A drouth then will not much interfere with the seeding, as the young plant, once started, will be pushed by the manure, the growth of the root keeping the start of the drouth.

Corn ground, if plowed early in the fall, should have its surface worked occasionally to destroy weeds, beginning as soon as the season will allow. If, after planting, the smoothing harrow be used for a few weeks, and the cultivator as long as the corn will admit, there will be few weeds left; indeed, there need be none at all, if the rows are put well apart, as the work on the soil may then be continued as late as desired, or till no more weeds make their appearance. This is really one of the most important things in corn culture, as it not only favors the growth of the crop, aided by sun and air, which the wide space between the rows favors, but cleans, pulverizes and enriches the soil for the succeeding crop.

Thus we see the advantage of beginning an early war against the weeds; but the work must be kept up in all hoed crops, including especially hops, where it may be continued till picking time, stirring only the surface. Sometimes a wet season interferes with the work; but no season is so wet but there are occasional times when the cultivator can be used, when all other work should give way to this, else the weeds are sure to hurt if not ruin the crop, and fill the soil with seeds for future trouble. Carelessness allows land to become foul. A desperate warfare with the weeds is before you and you must engage in it with unremitting effort, beginning early in the season, continuing until no more foothold can be obtained. Fortunately this work is a highly paying one; all the soil is now occupied by the crop, which, whether of grass or grain, is a clean one as well as increased in yield; the manure is clean; the land by working is improved in texture and fertility, working therefore easier. Unless hoed crops are thus treated there will be little or no profit; consequently no more land should be set aside for them than can be properly attended to, and it should be remembered that the work occurs in haying.

There is another thing that should be done early, but is sadly neglected in general, and seldom well done. It is the use of the roller. As soon as the frost is well out of the ground, and there is no danger of any more heaving, and the soil is not too soft (it will be firm enough early if there is good drainage), apply the roller to all grass lands whether meadow or pasture, and also to winter grain which needs it even more than grass. This packs the roots which were loosed and exposed to the air by frost. Snowy winters are favorable to protection; but the spring does always more or less harm to grass and grain, and this cannot be better corrected than by the roller, which, in effect, is replanting. But it must be done before the early, sharp, drying winds hurt the plant. To do this effectually the roller must be heavier than those commonly in use,—as heavy, with the usual length, as a good pair of horses can draw, better if three horses have to be used. After the wheat has been rolled and the plant has made some growth, having become well fastened, go over once or twice with a light harrow. This is equivalent to hoeing the wheat and is destructive to young weeds, and it favors seeding down, if that has been deferred.

Our State and national departments of agriculture are engaged in systematically collecting facts, tabulating them and working up the results into shapes usable by the average intelligence; while farmers' clubs and institutes, the Grange, the weekly agricultural paper and compilers of agricultural and horticultural manuals complete the work, supplying all with the latest improvements and aids that are useful to the community; and the general results can be readily enough seen by the striking contrast between the prosperous farming communities of the Northern States and those further South, even where they were not devastated by the ravages of war.

"High farming," which means such manuring and cultivation as will raise the most on a given piece of ground, generally, but not always, pays. It is remunerative only up to a certain limit. Mr. Lawes, of England, who has been systematically experimenting for 30 years, has ascertained, for example, that such manuring and cultivation as will produce 30 to 35 bushels of wheat per acre, yields a greater net profit than either lower or higher farming. Everything, therefore, depends on circumstances, and it is just those circumstances which our agricultural colleges and other institutions are engaged in finding out, for the interests of the farmer, the horticulturist, the dairyman, etc. Nearly every piece of ground can be improved by manuring and fertilizers, but occasionally a soil may be found that is so deficient in some mineral ingredient that no amount of manuring will render it good ground, unless one should haul also the mineral, yea, the whole soil from some other piece of ground to the spot, which of course would be too expensive. By such scientific study as is now made easy for the farmer by the manuals published, he will be able to ascertain what are the peculiarities of his land. Sometimes a very slight change in the management will make a remarkable difference in the results, and, on the other hand, a great change in the management sometimes yields no result.

Pasturing takes too much ground in a thoroughly settled country. The time will come, as Horace Greeley used to say, when all the feed will be raised and fed to stock.

During the winter the farmer and the gardener should plan for his next summer's campaign, deciding what he will do with this and that field, what implements he will buy, and what preparations to make, etc.; as to machines, and indeed, with reference to every other thing, he will endeavor to "read up," consult his neighbors and reason out his conclusions. The particular faults of machines and methods he should inquire into, so that in every step he makes he will get a little ahead of his neighbor. But beware of making too many radical changes in your line of business, as that causes a waste of machinery and material; for example, in changing from grain-raising to stock-raising, one loses much of his machinery and appurtenances which he had supplied himself with at great expense for the prosecution of raising grain crops.

"Co-operation" among farmers is a subject much talked of, and is a good thing for many purposes, as in the use of large machinery too expensive to be purchased by one man, in the arrangement of fences, roads and drains, the exchange of seeds, etc. It is true that many crops gradually run out if raised from seed grown on the same ground from year to year. Seed obtained from a distance will often do better. In the absence of co-operation, for example, in the employment of complicated machinery, where it requires the skill of experts to make them successful, it is best to let the particular machine remain as the property of one man, at least in the care of one man, and him be paid for his work by the piece. Where several farmers own a machine in common, it should be stipulated that the machine should have the same care in the hands of all; they all should have their ground in good condition, so that one would not wear out the machine much more than the others would.

The necessity and utility of co-operation afford a striking example of the pecuniary interest which every farmer has in keeping on good terms with his neighbors.

All tools and implements should be repaired in the fall, besides being stored away under good sheds. Small implements, as hammers, chisels, wrenches, etc., should be painted red, so that in hunting them up they will more readily catch the eye and be found.

In raising seed, it is best to go through the piece at the beginning of the flowering season and destroy all the imperfect plants, on the same principle that in breeding stock you would not breed to inferior strains or specimens. Much has been gained by close watching in this respect. For example, many years ago the potato rot was almost universal; by improving the quality of the seeds, varieties, fructification, etc., we have patatoes now that are not subject to rot; so all good qualities are continually being sought after by scientific breeding. Florists and originators of varieties are ever on the alert looking out for "sports," or "freaks of nature," as they are called, in the shape of larger or better or more beautiful specimens, which they enthusiastically seize upon and nurse and care for, and thus succeed in improving our stock. It is by this method that we now have all our luscious fruits, derived originally from the sour, crabbed things which are still to be found wild. So with our grains and all our vegetables. The largest seeds are generally the best, but not always. For instance, medium-sized grains of wheat on long, vigorous heads are better than large grains on small heads. The smaller, too, are often of much better quality. In crossing, the selection of closely related varieties of the same country is not quite so good as plants of a foreign country of the same variety.

Some farmers run themselves out by selling the best and keeping the poorest at home. In the course of time their stock becomes poor, and they fail to compete successfully in the market. Bad economy that. He should keep only his best specimens for stock. Farmers generally would grow rich if they only would do their best. A farm properly managed will increase in productiveness from year to year. Every agriculturist can find manure and fertilizers if he will only look around and be willing to work in the fall to collect it. "There is a class," says Greeley, "of drinking, hunting, frolicking, rarely working frontiersmen who seem to have been created on purpose to erect log cabins and break paths in advance of a different class of settlers, who regularly come in to buy them out and start them along after a few years."

While many fine eulogies and glittering generalities characterize the speeches and writings on the farmer's calling, we will here emphasize the most settled and important, namely: 1. Farming is the most independent vocation. 2. Farming is the most healthful vocation. The cities are kept up to what they are by a constant influx of the sturdy country element. The city man who accomplishes the most good is the one who frequently runs out into the country to recruit his physical and mental powers. 3. Farming is the most honorable, honest and revered vocation. It requires the honor and virtue of the country residents to keep up the integrity of the State. Were it not for the virtuous and "temperance" (abstinent) character of the agricultural community our cities and towns would be worse than they are. Country people, with less ceremony and hypocrisy, average more genuine politeness than city people do. 4. The life of a farmer (that is, of a scientific one, not a mere drudger), is more spiritual, poetical and elevating than all other conditions of life combined. Scientific farming develops the normal man; city life effeminates. All the advantage the city has over the country is convenience of trade and show. Extremes of intellect and prodigies of talent flock to the cities to make money by their extraordinary performances; "level" heads remain in the country to be "monarchs of all they survey."

A glorious future awaits the farming community of America. It is not generally known, even in cultivated circles, that the amount of arable soil in this country is greater than in Europe, Asia and Africa put together, and can therefore sustain more lives. This is no rash conclusion. Our continent is narrow, and therefore the winds of the ocean water it well. The mountain chains on the east side of the American continent are low; on the east side of the old world, are high. From this it results that the trade winds, laden with the wetness of the sea, are attracted to our land. The breadth of the old world and its high eastern ranges cause the rainless interiors of Asia and Africa. Again, America is the land of fertile plains; the old world of scorched plains. Our plains run north and south, and so attract and receive the rains. America is high under the equator, the old world is wide; hence, with us a small surface is exposed to the scorching sun. The result is that the productive soil in the old world is 10,000,000 square miles, and in the new, 11,000,000. Thus bursts upon us all in the light of scientific truth the fact that America can sustain a greater population than the old world; and if she can, it is unquestionable that some day she will.

Farmers' Clubs, associations of farmers for mutual instruction and protection. Meetings for mutual instruction should be our highest social happiness; but in any one community a large proportion of near neighbors are more or less out with each other, so that they cannot co-operate very well, and this is perhaps the only reason why any organization does not flourish more in the country. Kindred minds are too far apart, and qualified teachers are too scarce. As this has been the case now for many thousands of years, it is scarcely probable that there will be any radical change for ages to come, if ever; therefore let us get what good we can in our own life-time, by reading and conversing with friends. Carried on properly, farmers' clubs are eminently important and should be made popular, if personal prejudices, as above alluded to, could be overthrown. Each district has important topics to be discussed, and from a financial point of view should adopt every means for the advancement of their calling. The farmers of the present enlightened age are beginning to realize the fact that by comparisons, discussions, mutual conferences, and a hearty co-operation, progressive agriculture is to become the rule instead of the exception.

It is not sufficient that an isolated individual should struggle on with his limited stock of knowledge and experience; life is not long enough to develop to its fullest extent any one principle of science or art; each cultivator of the soil needs to know all that the wisdom and experience of others may teach. It should be as much a part of the farmer's programme of living to become an active member of some club, or grange, or gathering, in the interests of agriculture, as to plow and cultivate and plant his broad acres. No cultivator of the soil can afford to shut himself out of the warming, stimulating and beneficial influence of association with his brother farmers and the friction of discussion and debate.

The objects of the club should be the acquisition and dissemination of agricultural knowledge; the promotion of acquaintance and friendship among neighbors; the improvement of its membership in conversation, composition and public speaking; the improvement of farms, farm implements, stock, buildings, and every department of agriculture. Provision should be made for judicious and careful experiments, each to be confided to a certain number of the members, who would subject every portion of the operation to the most careful test of weighing and measuring, and carefully record every step. At the conclusion of each experiment a full report should be made to the club, by each person engaged in making the same, embracing all particulars and details, of soil, season, weather, etc. Every farmer should not only join a club, but take his enthusiasm into it.

A club can not be maintained without effort. Any one can start a club as well as any two or twelve, but where are the men to maintain it? Plenty of people are willing to be part of a political ring because it pays. Let the farmers of every neighborhood form an agricultural ring, a club that shall look after their own interests, mental, physical and pecuniary. It will pay as well as politics.

Farmers' clubs will produce more good farmers, and stimulate the production of more grain and provisions than national associations or societies. The great flood-tide of agricultural prosperity now permeating and revivifying every channel of industry throughout the country is the result, not of buncombe speeches, eloquent periods or magnificent resolves, but rather of long-continued, persistent, energetic labor on the part of individual farmers, each working out the problems in an humble and unostentatious way. There is room for little faith in any grand schemes for the advancement of agriculture which do not include the attendance and co-operation of the practical working farmers themselves. Men of ability should be employed to deliver courses of lectures. Fifteen to twenty dollars per week, with expenses, will secure good talent.

Clubs for the transaction of some special business, for mutual insurance, social intercourse, secret work of the orders, etc., are kept alive without the aid of popular sentiment, and a consideration of such societies or organizations falls without the scope of this volume.

Farrier, a horse-shoer; also, one versed in the care and treatment of horses; a veterinary surgeon.

Farrow, not producing young in a given season or year; said only of cows. If a cow has had a calf, but fails in a subsequent year, she is said to be "farrow," or "go farrow."

Farrowing, the parturition or the littering of the sow. She is said to farrow when she brings forth her pigs; and the number of her young ones produced at one farrowing are called a farrow or litter.

Fat, an unctuous, solid substance, or, more properly, a concrete oil, deposited in little membranous cells in various parts of animal bodies. It is generally white or yellowish, with little taste or smell, and varies in consistency according to the relative quantities of stearine and oleine which it contains. When examined under the microscope the cells are found to lie amidst the filaments of the areolar or cellular tissue, the most extensively diffused of all the tissues of the human body; and are found everywhere in the network of tissues composing the living body. Fat, however, is not a component part of the living organs, for the nerves and blood-vessels do not run through its cells. Therefore the fat itself is not susceptible to feeling, and if a pin could be passed into it without piercing the skin there would be no sensation to make the owner of it conscious of what had been done. Matter contained in the fat-cells has various names. When melted down it is called tallow. In another form it is known as lard. When it is the refuse of fat it is called grease, or kitchen stuff. When hard, we call it suet; when soft and separated from milk, it is called butter; when liquid, oil. Fat is composed of 11 parts of carbon, hydrogen 10 parts, and oxygen 1 part; and its use in the animal system is to give those beautiful gradations of contour possessed by the properly developed human figure, to keep in the heat, of which it is a bad conductor, to serve as a store of spare fuel for an emergency, for which reason it contains both carbon and hydrogen, which are the elements we employ for lighting and heating, and to secure the proper nourishment of the animal body. Fat cells surround every tissue, and where there is a deficiency of fat there also will be found a deficiency of other tissues. In a case of consumption, where the body wastes rapidly away, the daily administration of oil—usually cod-liver oil—is found to be very beneficial. As the fat is deposited the tendency to develop those tissues on which bodily strength depends is increased. An excessive accumulation of fat in certain parts of the body, generally induced by indolence and by the more extensive use of fat-producing food, interferes with the vital energies, and unfits the body for a proper degree of exertion.

Of the varieties of fat in quadrupeds, suet is the finest. The next in hardness is the fat of bones, and the next to that the fat in the muscles. The fat of the hog is the least solid. The fat of birds has little solidity, and in many species it is always fluid; this is usually distinguished by the term grease, as goose grease. The fat of fish is always in oil or fluid, except spermaceti.

Different kinds of fat liquefy at different temperatures; lard melts at 97°; tallow requires a heat somewhat greater; but the fat taken from suet by boiling requires 127° to liquefy it. The great inflammability and the bright white light it gives while burning renders the most solid kind, tallow, eminently serviceable for producing artificial light. Tallow itself will not inflame; it is only the vapor that inflames, and it does not boil until it is heated to 400°.

Marrow differs from other fat only in the fineness of the membranous texture in which it is contained, the fluidity of the oil and its situation within the bones. Fat, as well as all fixed oils, is difficult of digestion, particularly by weak stomachs, and therefore it is not proper for dyspeptics. It is apt to cause bile in the stomach. But fat is rendered still less digestible when subject to high temperatures in some culinary processes, as in frying. All meats and fish that contain much oil or fat are apt "to lie heavy at the stomach," as it is called, or, in other words, to be difficult of digestion; and then they are apt to occasion heartburn and other injurious effects. It is thought, however, that bacon and salt pork are more easily digested than fresh fat.

Fatness of the Human Body, to prevent: Abstain from starchy foods and work hard at manual labor. To obtain healthy fat in the body, live according to all the laws of health as noted under the head of Hygiene in this volume; to become fat more rapidly, but unhealthfully, remain inactive, drink beer or other liquors and diet on the grain foods.

Fattening of Farm Animals: see respective animals and Feeding. The general principle for producing healthy fat is, give the animal all the food he will eat up clean and no more. Of course it is understood that the food should consist of the proper article, clean, of sufficient variety, with the various natural condiments, as twigs, roots, etc., such as they have an avidity for when at large in their favorite clime; also, clean pasturage, freedom from disease and from molestation. For producing unhealthy fat (which can be done more rapidly), keep in close confinement and feed almost exclusively on starchy food, with such stimulants and appetizers as will make the animal overeat, contract a diseased liver and caul, etc. Some degree of darkness and filth will aid the process with most animals, but rather hinder it with some. Most diseases, of course, emaciate. In fattening swine for other purposes than food for man, it is probably more profitable to adopt the disease-producing method. See Feeding.

Faucets of wood are certainly more free from poisonous oxides than one of metal of any kind. To prevent wooden faucets from cracking, boil them in paraffine as long as bubbles of air escape from them; allow the paraffine to cool about 120°, when the faucets are taken out and rubbed clean with a dry piece of coarse cloth. In boiling them they should be put in when the paraffine is just melting, and the temperature kept at about 212°.

Feather, of a plow, is the thin cutting part of the share; also, the ridges of hair on the legs of a dog.

Feathers. To obtain feathers in their best condition they should be plucked from the fowls dry. A few days' airing then puts them in proper condition for use. Feathers which have been picked from scalded fowls require much care and work to restore the original buoyancy of the down. Strip the plumage from the quills of the larger feathers, and mix them with the small ones, putting the whole loosely into paper bags, which should be hung up in the kitchen or some other warm place for a few days, to dry and cure; then bake the bags three or four times, half an hour each time, in a lukewarm oven, drying them for two days between each baking. The work is then done. Kneading the bags aids and hastens the process.

Feather-beds that have become soiled and heavy, may be made clean and light by being treated in the following manner: Rub them well with a stiff brush, dipped in soft soap-suds. When clean lay them on a shed roof, or any place where they will be clean, and the rain will fall on them. When thoroughly soaked, let them dry in a hot sun for six or seven days, shaking them up well and turning them over each day. They should be covered over with a thick cloth during the night. If exposed to the night air, they will become damp and mildewed. This way of washing the bed-tick and feathers makes them very light, and is much easier than the old-fashioned way of emptying the beds and washing the feathers separately, while it answers quite as well. Care must be taken to dry the bed perfectly before sleeping on it.

Another method to cleanse goose feathers is to expose them to the sunshine or in a stove until perfectly dry, then beat to remove dust. When carelessly collected and dirty they may be cleansed with lime water; or, still better, with a weak solution of carbonate of soda, or with water containing a thin solution of chloride of lime; after which they are rinsed in clean water and dried as before.

To clean and curl feathers use white soap (or, better, curd) cut into small pieces; pour on boiling water, and dissolve. When cool, draw the feathers through the solution. Repeat this several times, press the feathers gently in the hand, or carefully pass through the fingers two or three times, to squeeze out the dirt. Use another lather in the same manner. Remove the feathers and rinse well in cold water; beat against the hand or a clean cloth, and wave around in the air a short distance from the fire. Before quite dry curl, with a penknife, each fiber separately, by drawing carefully over the blade's edge. Or, after heating, stroke them with the back of a knife. This can be used for all feathers but black; they may be cleaned with water, adding to it some gall, and following the above directions in all respects. Feathers of brighter colors cannot be cleaned, but must be redipped, as they usually fade by exposure to the sun.

To dye feathers, first steep them a few hours in warm water; then, to dye blue, boil them in a solution of extract of indigo, simmering over the fire a few minutes. To dye green, dip them in a solution of equal quantities of verdigris and verditer. To dye lilac, dip in a hot solution of cudbear. To dye red, boil together for half an hour Brazil-wood, a little vermillion, alum and vinegar; then dip the feathers. To dye yellow, use turmeric in a similar manner. For scarlet, take cochineal, cream of tartar and muriate of tin.

Feed, relative value of the different articles for domestic animals, equivalent to 100 pounds of hay:

	POUNDS.		POUNDS.
Clover	95	Peas	44
Rye Straw	355	Beans	46
Oat Straw	220	Rye	49
Potatoes	195	Barley	51
Carrots	280	Corn	56
Beets	346	Oats	59
Ruta-bagas	262	Buckwheat	64
Wheat	43	Oil Cake	64

The hay consumed by different animals does not vary greatly from three pounds daily for each hundred pounds weight of the animals. The following ratios have been determined, allowing the articles, of course, to be of good quality:

	POUNDS.		POUNDS.
Working Horses	3.08	Steers	2.84
Working Oxen	2.40	Dry Cows	2.42
Milk Cows	2.25	Pigs	about 3.00
Young Growing Cattle	3.08	Sheep	3.00

Feed Cutter, a machine for cutting straw, hay, cornstalks, etc., for stock feed. While a large one, to be run by horse or steam power, is justifiable only on large farms, a hand-power cutter, such as represented by the annexed engravings, should be in the possession of every farmer. A great deal of fodder, which would be otherwise wasted, can be saved by the use of the cutter.

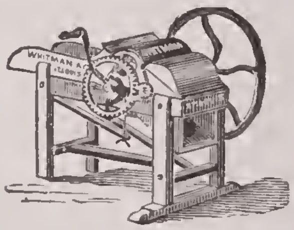


Fig. 1.—*St. Louis Feed Cutter.*

A feed cutter that would really cut hay, straw and corn-stalks equally well, to lengths suitable, and that would run easy, and stay in repair, has long been desired by the best of farmers, and many others who have stock or horses to feed. It is claimed

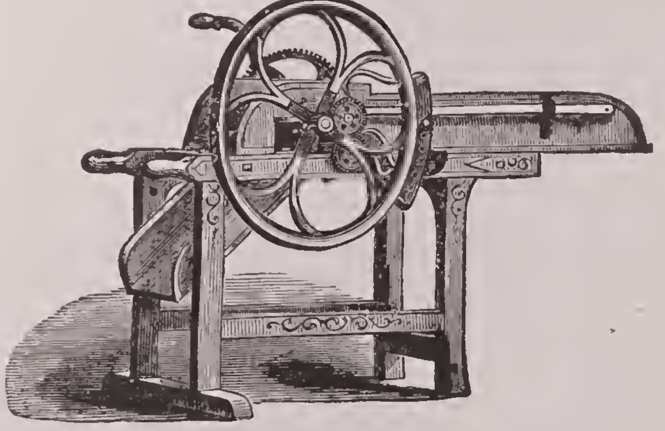


Fig. 2.—*Miller's Straw and Feed Cutter.*

for the cutter shown by Fig. 1 that it does this work satisfactorily. Fig. 2 represents a machine made on the same principles, and used for the same purposes.

The machine shown by Fig. 3 is self-feeding, the fodder being taken by two notched iron rollers and held firmly until cut by the knives, which are fastened to a strong knife-wheel, and are adjusted by set screws, so that they will *always* cut clean, clear, and not drag straw through uncut.

Feeding Stock: see Stock.

Feed Mills, machines for crushing and grinding of grain to be fed to stock. That the crushing and grinding of grain insures more perfect mastication, and may be performed by machinery at much less expense than by the animals consuming it, no intelligent farmer will deny. Then the final step toward the easy and profitable assimilation of food is the steaming or cooking process, which we very fully treat under the head, "Feed, steaming and cooking," a little further on. As in all departments of agriculture where machinery is needed, inventors have not overlooked this branch, for there may be found in the market numerous makes of feed mills.

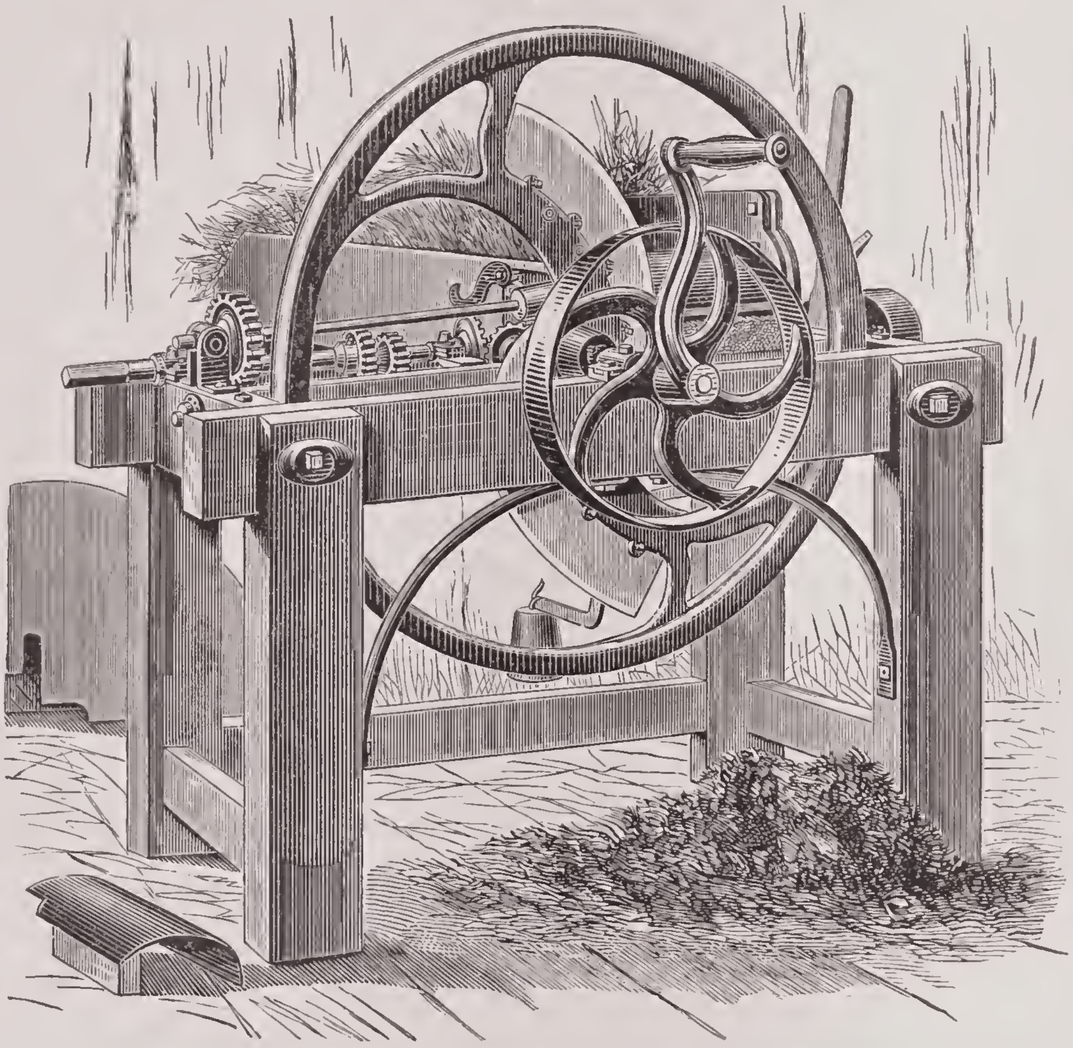


Fig. 3.—*The Belle City Feed Cutter.*

Some of these grind the ear, cob and all, and thereby save shelling.

Fig. 1 represents a corn and cob mill for grinding feed for stock. It can be geared either from above or below; will not choke, grinds fast, feeds regularly, and grinds fine.

Fig. 2 is the representation of another corn mill or crusher, placed on a platform, with legs. It is light running, has a large strong hopper, and will grind with the husk on as well as without; and the farmer who is able to own a mill as represented by Figs. 1 and 2, and will use it to advantage, will soon more than realize the amount expended, in the continued improvement of his farm-stock.

J. A. Field & Co., St Louis, Mo., manufacture a grinder and crusher, Figs. 3 and 4. It is made of "cast cast-steel." This mill will grind coarse or fine, for stock or for the table, and its capacity is extraordinay for its size. When the grinding plates are worn out, they are easily replaced with new ones. Iron grinders are also furnished with this mill. For grinding corn with the husks on, the breaker arms are so constructed as to form a cutter, which, with the blades on the mill, cut the husk. The tubes, Fig. 4, aid in forcing down the husk through the mill.

Fig. 5 represents a mill adapted to the grinding of corn and feed for stock and family purposes. It is simple in construction, and a boy can operate it, keep it in good order, and easily make good meal with it. It will make good meal, grind wheat, middlings or minerals, and all kinds of feed as fine as flour, or as coarse as may be desired.

One of the best standard farm grist-mills is made by Livingston & Co., Pittsburg, Pa., Fig. 6. It makes good meal for family use, has an improved automatic feed check, is reversible and self-sharpening. The grinding plates are made of chilled iron, will last for years, and when worn out can be replaced at a small cost. It can be run by hand or belt, will grind from six to ten bushels of feed per hour, and delivers the meal direct into the bag when desired.

On the two following pages we give the illustrations referred to above.

Few persons realize how palatable and rich is the taste of bread or mush made from fresh-ground corn meal, or even wheat and rye meal, as compared with the dusty, musty stuff they generally use. Grinding from day to day only what you use, you can commence with new corn in August or September, and have an article of food as different from, and as superior to, common breadstuff as cultivated apples are compared with crab-apples. With the ordinary process of wholesale milling, new corn or other grain cannot be used, for the meal from it would keep sound and sweet but a few days. A hand mill, even if but a large coffee mill, is therefore the means of a great luxury in a household.

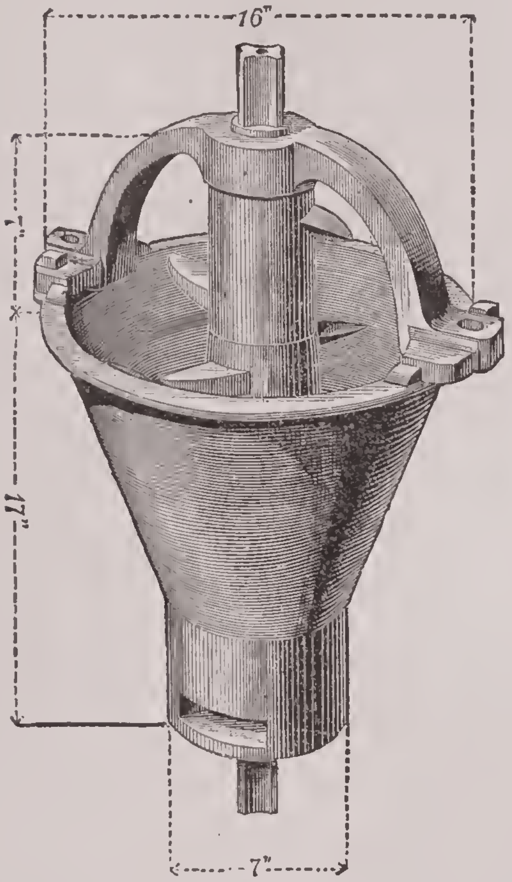


Fig. 1.—*Economic Corn-Crusher.*

Feed Rack. The farmer, with stock, should always provide himself with a feed rack. It may be of poles, rails or stakes held in place by laying a pole in the rack, or spiking each stake to the horizontal pole. A good rack may be provided by placing stakes between fence-boards, and nailing a two-inch strip between them.

Feed, Steaming and Cooking. Cooking food for live stock is no new experiment. It has been practiced in all countries for years, and the universal testimony is, it pays. It is estimated by all the best stock men of this country, after years of experience and observation, that at least one-third the feed is saved by steaming. Grain, hay, vegetables, corn-stalks, and, in fact, all substances used as food for stock are greatly improved in nutritive value by steaming.

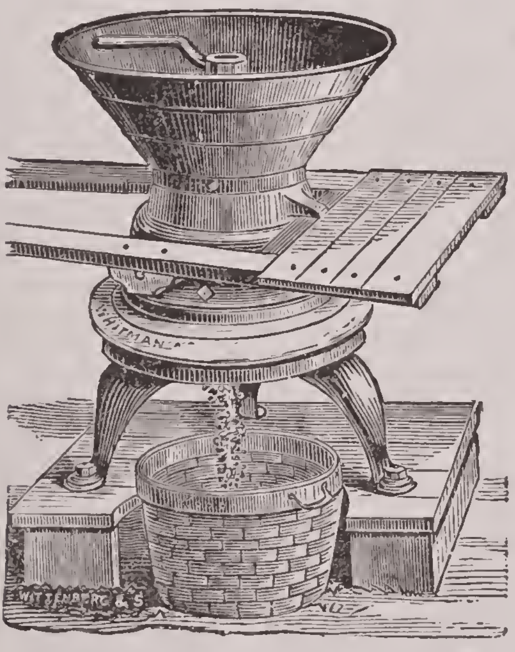


Fig. 2.—*Young American Corn and Cob Mill.*

The additional cost of cooking food for large lots of stock is only about one-seventh of the amount saved thereby. With the proper arrangements for performing as much as possible of the work by power, one man can cook for and feed 100 head of cattle.

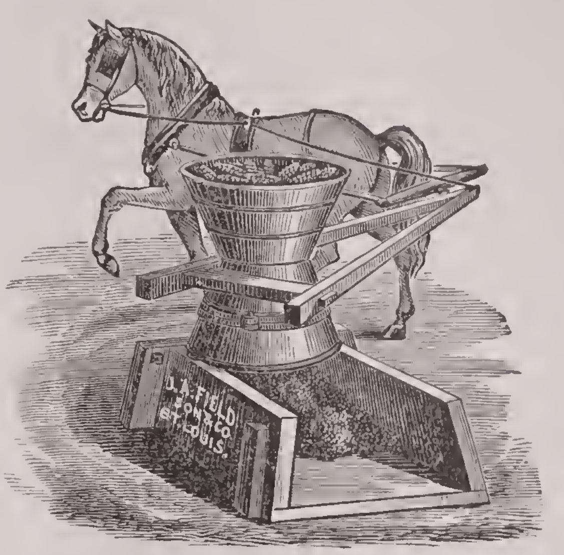


Fig. 3.—*Cast-Steel Grinder.*

The following advantages for cooking food have been deduced from years of trial and innumerable experiments:

It has a remarkable effect upon musty hay, straw and corn-stalks, rendering them sweet and palatable. Hay which animals will not touch, unless starved to it, will be greedily eaten after cooking.

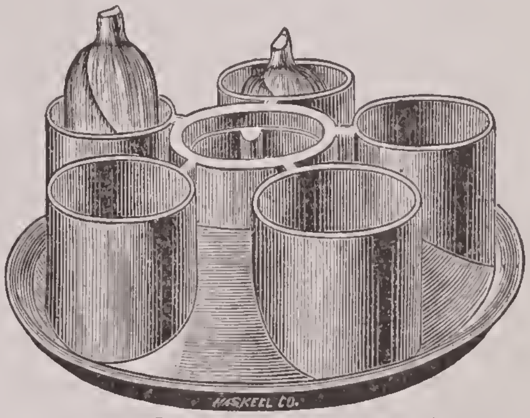
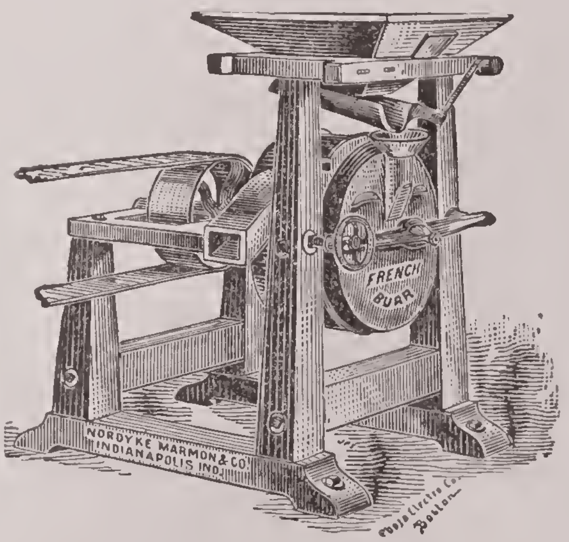


Fig. 4.—*Grinding Corn with Husk on.*

This effect of steam in renewing the flavor of damaged food, suggested the mixing of different qualities to produce a proper balance—good hay with straw, sliced carrots, turnips and beets, with poor hay, etc., blending their qualities and sugar-coating the less palatable and coarser forage, so that a larger proportion of it may be eaten. Animals are much less liable to become clogged when the feed is thus mixed, than when the rich and palatable is fed separately, and thrive much better with a frequent change of food or mixing of different kinds.


FRENCH BUHR
NORDYKE MARMON & CO.
INDIANAPOLIS IND.
Fig. 5.—*Corn and Feed Mill.*

The purgative tendency of fruits and roots is greatly diminished by cooking, and a larger quantity may be fed with impunity.

Peas and beans, rich in nitrogen, as well as pea and bean straw, usually wasted, are readily eaten by stock, when steamed. Bean straw, dry and unpalatable when uncooked, in steaming becomes soft and pulpy, and emits an agreeable odor. It is rich in albuminous matter, making it especially valuable for milk-cows. Bran undergoes a great improvement in the flavor in steaming.

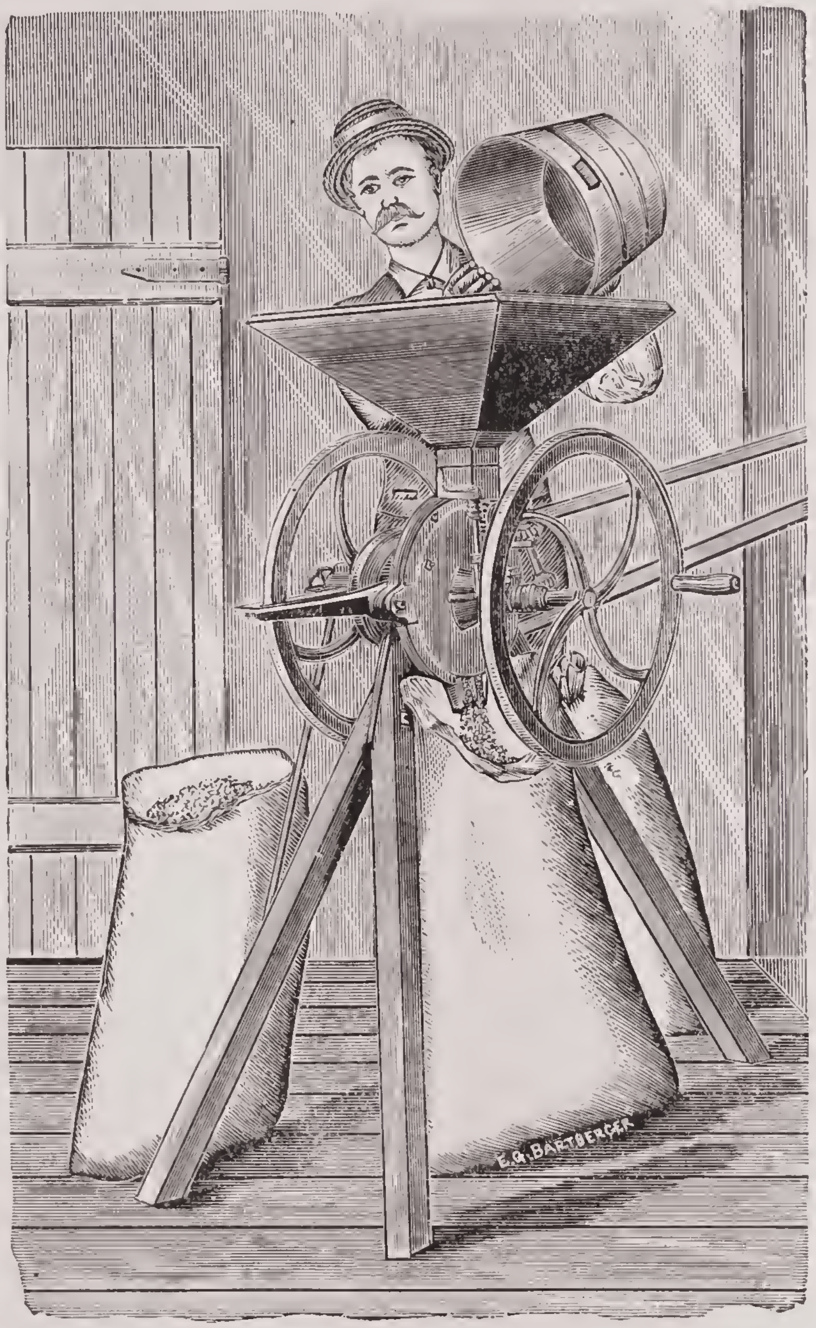


Fig. 6.—*Farm Grist-Mill.*

This system is admirably adapted to the raising of young stock, making their food the year round as soft and easily masticated as the tender herbage of spring, and thus obviating all the troubles resulting from teething. With it, colts and calves are uniformly larger and stronger than those fed in the ordinary way. Heifers become cows at two years old, saving a year's time and care.

The manure made from cooked food decomposes more rapidly, and is therefore more valuable than when used in a fresh state.

Cooked food will cure incipient heaves and troublesome coughs in horses more effectually than any other remedy.

It enables fattening stock to eat their food with less labor, and saves one-third of the time required to fatten them.

It gives work-horses time to eat all that is necessary in the intervals of labor.

The season for making cheese and for butter dairies, dependent upon green pasturage, by cooked food might easily be extended from seven to ten months.

Cooking is a complete corrective of the unhealthfulness of mildew, rot, smut and other diseases of wheat, grass, corn, etc.

It enables the feeder to use everything he raises as food for stock, without lessening, but rather improving its value as a good manure. Steaming is found to be the most practical and economical way of cooking. Any arrangement by which steam may be generated under the slightest pressure required to make it permeate the mass to be cooked and conducted to the vessel in which the steaming is to be done, will answer the purpose.

We present views on the two following pages of four of the best feed-steamers now made.

The various operations it will facilitate makes the steamer especially desirable for farmers. For cooking feed it is superior to a kettle or cauldron, as it has much greater capacity, performs the work more quickly, never burns the feed, and requires but little fuel. Hay and corn-stalks should be wet, and most other kinds of feed thoroughly mixed with water, before steaming.

By protecting the cooking apparatus from frost or cold, using a tight heating vessel with cover, and not over-cooking, a waste of steam will be avoided, thus saving a large percentage of time and fuel.

The Anderson steamer, Fig. 1, is well adapted for cooking food for all kinds of stock; for heating milk or water in cheese factories or milk dairies; for heating water or rendering tallow for butchers' use; steaming cheese-box material; or for any purpose requiring a light, portable and economical boiler. The cut shows the steamer as set up and ready for use, and shows the form of float-box, with steam whistle and attachment belonging with it. The food may be cooked in ordinary barrels, or tight water vats or boxes of any suitable size. If these steamers become coated with lime scale by the continued use of hard water, this may be removed by using soft rain-water for a time, which detaches and dissolves the lime scale, and can then be readily rinsed or washed out of the bottom opening left for that purpose. This is important to bear in mind, not only for the preservation of the boiler, but as a saving of fuel.

Dalley's Steamer and Evaporator is portable, and is very simple in construction. It cooks stock feed, heats water for scalding hogs, evaporates cane juice, etc.

It consists of a cast-iron furnace, arranged to burn coal or wood, or any other kind of fuel. It is 6 feet long, 26 inches wide, and open flue, which gives a 12-foot heating surface. The steam-chest is 6 feet and 4 inches long, 28 inches wide at the face, 14 inches deep, and holds 10 bushels, but it can be enlarged to 30 bushels. This steamer is made of wood encased with galvanized iron; has a perforated bottom, which is placed inside the steam-chest, leaving space underneath for about six pails of water. Cornstalks, hay, straw, corn in the ear, shelled corn, or meals, or any class of food is placed in the chest above the perforated bottom, the cover closed and the fire started. The steam rises uniformly through the perforations in the false bottom and cooks the mass above it. The steam-chest can easily be removed, as it sits on the furnace as a boiler sits on a cook-stove, and in the place of the steam-chest, a pan for evaporating sugar water or sorghum can be used.

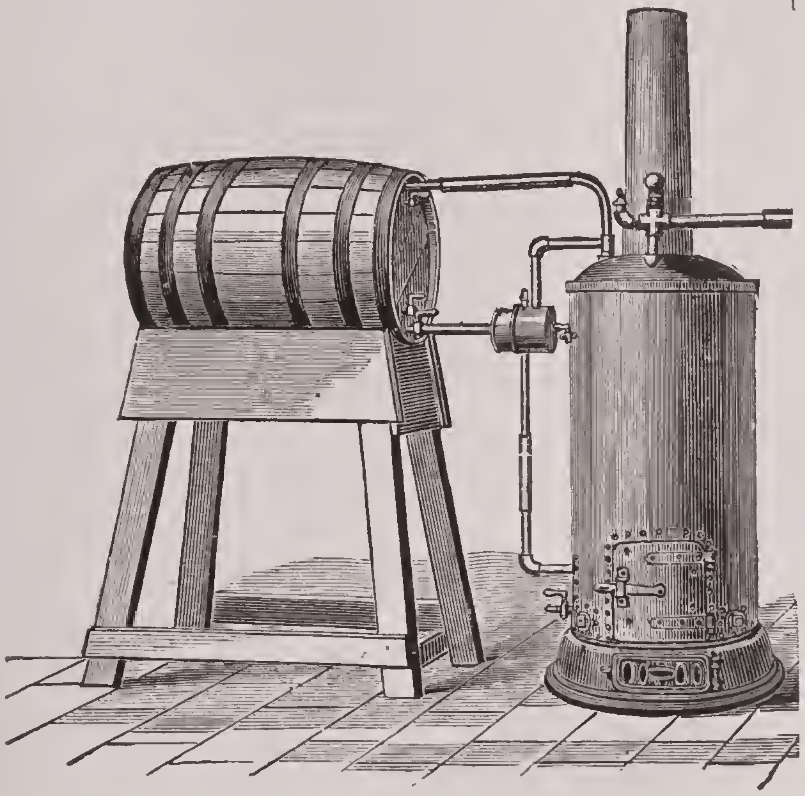


FIG. 1.—*The Anderson Steamer.*

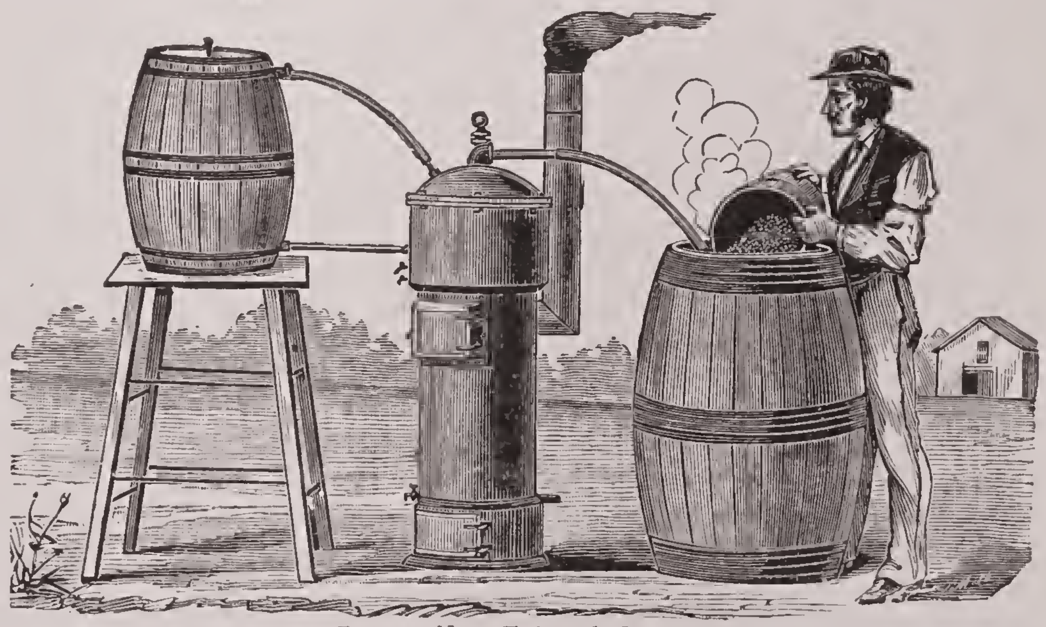


FIG. 2.—*New Triumph Steamer.*

Feeding Animals. The dietetic treatment of animals, as to the kinds, the quantity, the frequency, the preparation, and the condition of their food, and the circumstances under which it is given, should receive the zealous attention of farmers, and especially those engaged in stock-raising to any extent. The sorts of food proper for man are noticed in our articles on Food and Hygiene; the dietetic treatment of the several classes of farm animals is noticed, in our articles on Cattle, Ox, Horse, Sheep, Hog, etc. Though the topics proper to the present article might be discussed at great length, and pursued through multitudes of ramifications, yet, to prevent wasteful repetition, they must be restricted within such limits as shall not invade those of any of the articles named.

THE GENERAL PRINCIPLES OF FEEDING. A prevailing law in all proper feeding of animals, but one which in several instances is grossly violated in the dietetic treatment of live stock of multitudes of farms, is the use of as large a proportion of nitrogenous principles as shall maintain the normal amount of nitrogen in the assimilations and secretions of the animal system. Nitrogen is emphatically the characteristic element of both animal organism and animal aliment, not only in the case of carnivorous animals, but in the case also of herbivorous, and especially of the granivorous; and whenever it is not present in due quantity in the food of any animal, they cease to acquire substance, begin to lose strength, and eventually lose constitutional vigor and healthiness, and sink into emaciation and death. The increase of the mass of the body, the development of its organs, and the supply of waste are all dependent on the blood, that is, on the ingredients of the blood; and those substances only can properly be called nutritious, or considered food, which are capable of conversion into blood. To determine, therefore, what substances are capable of affording nourishment, it is only necessary to ascertain the composition of the food, and to compare it with the ingredients of the blood. But the chief ingredients of the blood contain nearly 17 per cent. of nitrogen; and no part of any organ of the body contains less; and animals can not be fed on matters destitute of nitrogenized constituents. But vegetable fibrine, vegetable albumen, and caseine are the true nitrogenized constituents of the food of granivorous animals. These three principles contain the same elements in the same proportion by weight, and are identical in composition with animal fibrine and animal albumen, the nitrogenized and most important constituents of the blood. Vegetable fibrine and vegetable albumen, in fact, hardly differ from animal fibrine and animal albumen even in form; and the former are simply the latter in a state exterior to the animal system, and of an elaboration independently of it, and of thorough preparedness, under the benign arrangements of the Creator, to be taken into it for its appropriation and support. When, therefore, the nitrogenous principles are wanting in the stated food of animals, the very flesh and blood must die out for want of aliment; and when these principles are in deficient quantity, the flesh and blood will fail exactly in the proportion of the deficiency.

An important and familiar illustration of this rule, quite sufficient to show the necessity of attention to it in all the departments of feeding live-stock, is afforded by the alimenting of sheep or cattle upon turnips. The proportion of the nitrogenous principles in turnips is enough to prevent any perceptible diminution of strength, and even enough to promote a certain degree of growth and healthiness, but not near enough to produce a maximum or even a normal development of bulk and energy in the animal system; so that sheep fed on turnips can not duly thrive, and will not favorably fatten unless they receive also a portion of the cereal grasses.

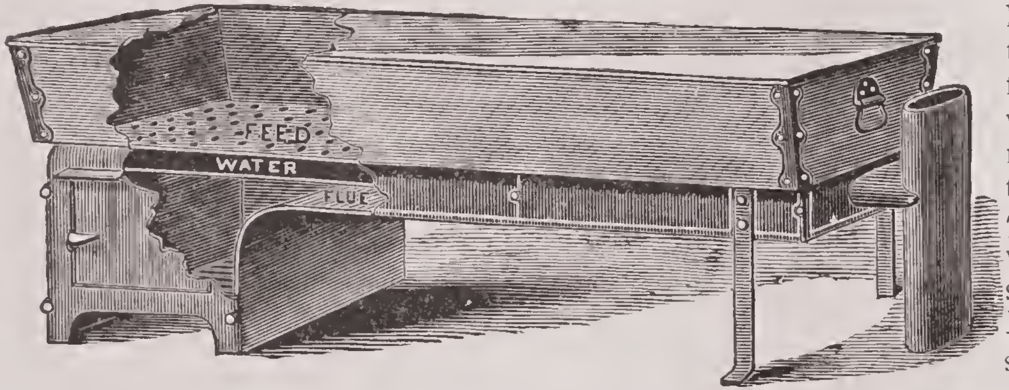


Fig. 3.—*Dalleys' Stock Food Steamer and Evaporator.*

Another pervading law in all proper feeding of animals, and one which has been grievously overlooked in almost all experiments for ascertaining the relative effects upon cattle of different kinds of food, is maintaining such a warmth by shelter during the cold season of the year as shall prevent a wasteful expenditure of animal heat by radiation into the atmosphere, and therefore a wasteful expenditure of aliment in producing volumes of heat in lieu of those lost by radiation. The living system of animals constantly accumulate large quantities of carbon and hydrogen from their food, the mutual action of oxygen and these elements of food is supposed to be the chemical accompaniment of their vital heat; and the dissipation of the carbon and part of the hydrogen from the blood by oxygenizement or the formation and expulsion of carbonic acid and aqueous vapor, are supposed to be the chemical accompaniment of respiration; so that the amount of nourishment required by the animal body, or at least of the carbonaceous and hydrogenous elements of nutrition, is theoretically assumed and has been practically tested, to be proportionate to the expenditure of heat generated within the system, whether that expenditure have the form of accelerated breathing and increased perspiration occasioned by the relative low temperature of the surrounding air. The clothes of the man and the shelter of the brutes, therefore, serve in winter as an equivalent for a certain amount of food. The more warmly men are clothed and brutes are sheltered, within certain limits, the less food will they consume; and the less protected they are from the colds of the winter, also within certain limits, the more food do they require. "If we were to go naked like certain savage tribes, or if in hunting or fishing we were exposed to the same degree of cold as the Samoyedes, we should be able with ease to consume ten pounds of flesh, and perhaps a dozen tallow candles into the bargain daily," as warmly clad travelers have related of these people. We should then be able to take the same quantity of brandy or train-oil without bad effects, because the carbon and the hydrogen of these substances would only suffice to keep up the equilibrium between the external temperature and that of our bodies.

As the fattening of animals has become a matter of dollars and cents to the farmer, and as economy is at the base of all success, it becomes important that he should make every pound of fat at the least possible cost. Much of the food the animal eats is consumed in warming the atmosphere which surrounds it, which would not be needed if the temperature of the atmosphere was 70° or 80°. Now, the question is, Can we not warm the atmosphere around our stock with cheaper material than corn? In 1859 corn was burned in Illinois instead of coal, to warm dwellings; but an equal vandalism is committed in feeding it to stock exposed to inclement weather. Of course all stock should be protected from severe winter winds and storms, yet this is not enough, for even a quiet atmosphere, if very cold, requires a vast amount of food to keep it warm around the animal.

The fact is, farmers do not stop to count the cost of raising corn, or what might be saved in money by intelligent feeding. They feed grain without calculation as to profit. If they think they have made money on the season's operation it is all right; otherwise "the season was bad," "the crops poor," or something was wrong. The result is charged to Providence, when it is only the indifference or ignorance of the farmer himself.

Our suggestion then, is, that animals be kept in warm, well-ventilated houses of such temperature as would be comfortable for human beings to live in. These buildings should be heated with coal or wood, to warm the atmosphere around the stock and prevent it from exhausting the heat from their bodies. All the heat extracted from an animal by a cold atmosphere costs money, and is a useless waste of food, for the heat can be supplied with fuel at a much less cost. A sheep or hog will consume about as much air as a man, hence would require about the same facilities for ventilation, while a cow will consume at least as much.

If the following rules are observed by the farmer in feeding his stock, he will find they will thrive and fatten much quicker, and with less food, than did he ignore all the essential principles:

1. Very young animals require large quantities of phosphate of lime for bone formation. This is found more largely in milk than in any other food.
2. Growing animals require not only bone formation, but the production of muscle and a certain proportion of fat. The grasses, roots and grains supply these.
3. Horses, cattle and sheep should be given hay always, when fed with roots or grain.
4. Fattening animals should have an abundance of food abounding in vegetable oils or fat, starch and sugar. Corn, probably, contains the several ingredients in the best proportion for fattening purposes. The potato contains a large amount of starch, and the beet has large quantities of sugar, and both may be fed with hay.
5. A mixture of food is always desirable, especially in fattening animals. This will be a perpetual stimulant to the appetite.
6. Such a system of feeding and sheltering should be adopted as will keep the animals in a constantly improving condition. They should not be permitted to rise and fall in condition with the changes of the season.

Feeling, one of the five external senses, by which we obtain the idea of solid, hard, soft, rough, hot, cold, wet, dry and other tangible qualities. It is the most universal of all the senses. We see and hear with small portions of our bodies, but we feel with all. Nature has bestowed that general sensation wherever there are nerves, and they are everywhere where there is life. Were it otherwise, the parts divested of it might be destroyed without our knowledge. It seems that upon this account nature has provided that this sensation should not require a particular organization. The structure of the nervous papillæ is not absolutely necessary to it. The lips of a fresh wound, the periosteum, and the tendons, when uncovered, are extremely sensible without them. These nervous extremities serve only to the perfection of feeling, and to diversify sensation. Like every other sense, feeling is capable of the greatest improvement; thus we see that persons born without arms acquire the nicest feeling in their toes; and in blind people this sense becomes so much developed that persons born blind, and acquiring the faculty of sight in after life, for a long time depend rather on their feeling than their sight, because they receive clearer ideas through the former sense. A person in this condition, who could not remember the difference of things if he only saw them, as soon as he touched them distinguished them perfectly well. Feeling is the most common of all the senses, as it exists in all creatures which have any sense at all; even some plants show a sensibility to touch. Many animals have no sense but that of feeling.

Feet. The care of the feet is so important that a complete volume on the subject has recently been published. We will attempt here to give a condensed statement of the most important considerations. Wash them every night, especially if inclined to sweat. If abnormally given to sweating and coldness, wear cotton socks next to the skin, changing them, in severe cases, several times a day; or mix together 7 ounces carbonate of magnesia, 2 ounces calcined alum, powdered, 7 ounces orris root and ½ drachm powdered cloves, and cover the feet with this in the morning. An offensive smell may be corrected by bathing them in a weak solution of permanganate of potassa, 1 scruple to 8 ounces of water. Cold feet should have a great deal of friction, and it is unfortunate for such a person if he has a sedentary occupation. To cure slight frost-bites rub with a cold flannel or with the hands, avoiding fire heat, or even a warm room. To relieve the itching caused by frost-bites, wash the feet two or three times a day with a solution of 1 ounce hydrochloric acid to 7 ounces rain-water. To remedy blistered feet from long walking, rub them, on going to bed, with spirits mixed with tallow dropped from a lighted candle into the palm of the hand. Ingrowing toe-nails are caused, generally, by trimming around the corners too closely. When the case has become so bad that tender or proud flesh is formed, apply to the part a small quantity of perchloride of iron; this causes some pain, but it will be sure to kill the flesh, which, two or three weeks afterward, can be soaked soft and pared off. To prevent the nails from growing in, scrape the tops of them very thin with a piece of broken glass, and do not trim them close around the corners. To prevent all troubles generally, wear shoes two or three sizes larger than fashion would dictate, with soft uppers and thick soles. Leather is not so healthful for the feet as some vegetable material would be, but it seems the world has not yet thought of making vegetable shoes. See Bunions, Chilblains and Corns.

Feline Animals, carnivorous animals furnished with sharp incisor teeth and retractile claws, as the cat, lion, panther, tiger, etc.

Felloe, or **Felly,** one of the pieces of the rim of a wagon wheel into which the spokes are inserted.

Felling, the cutting down of trees. The common methods of felling are simply to hew with the ax, to cut with the cross-cutting saw, or to alternate or combine the action of these two instruments. But a superior method, in the case, at least, of all large, straight, and valuable trees, is to employ the saw, and to combine with its action the use of the wedge. In order to make the tree fall the way required, enter the cross-cut, say, on that side of the tree it is intended to fall, and cut it about a third part through; then enter the saw on the other side, and when it is cut so far as to admit a wedge, place the wedge exactly opposite to the way you want the tree to fall, and keep driving it closely until the tree is nearly cut through. Be sure the saw meets the opposite cut equally on both sides; and do not imagine, as some have done, that by making the saw meet sooner through the one side than the other, the tree will fall to the side soonest met or first cut through; on the contrary, the side of the tree longest in being cut is that side to which the tree will naturally fall. Every tree, in being felled, ought, for the sake of the value of the timber, and also for other considerations, to be cut as near as possible to the ground. All young trees and all constitutionally soft trees, in fact, ought to be felled about midwinter, when little or no albumen exists; and all old and constitutionally hard trees may, generally speaking, be economically felled at almost any time of the year. A tree about to be felled ought to be carefully divested of any arm or branch which may be at all likely to occasion damage to it in its fall. Any very large bough should be chopped or nicked one-third through close to the junction with the trunk, by strokes of the ax below; and if then struck with a few downright strokes on the upper side, it will be severed without splitting. A clear place for the fall of the tree should be selected, such as will prevent it from damaging other trees, or from impairing shrubs, fences or other objects by its fall; and the felling process should be so performed as to make the tree descend through this space. Careless woodmen, in consequence of taking insufficient precaution to guide the fall or of hewing into the stem without due reference to the proper point of upsetting the equilibrium, often perpetrate very serious and costly damage. A common precaution in the case of any considerable tree in a somewhat crowded situation, is to attach ropes to its upper parts by means of climbing-boys or a ladder, and to have the ropes pulled by one or more assistants in the direction in which the tree is intended to fall.

The stump or stool of a tree is that part which remains in the ground after felling; and this, in some instances, dies away, in others makes shoots which can be coaxed up into new trees, and in others is grubbed up or otherwise artificially destroyed, to make way for the passage of the plow. The stools of some trees, such as those of many of the pine tribe, never send out shoots; and the shoots of others, such as those of oak and ash trees, readily send out each from ten to twenty shoots.

Felon (fel'on), or **Whitlow,** a very painful inflammation of the fingers or toes, usually of the last joint, commencing near the bone, and pressing out the flesh with more or less rupture. The following remedies are recommended: A small piece of calf's rennet soaked in milk, occasionally renewed; kerosene, thoroughly applied; salt roasted within a folded cabbage-leaf and pulverized; soap salve, or lye; poke-root roasted and put on hot; blister with cantharides for six hours, and then extract the core with a needle or lancet; poultice with a mixture of soft soap and yolk of egg in equal quantities, with a little salt and turpentine, and so on world without end. Perhaps the virtue of all these consist simply in producing the most comfortable temperature, which can be as well done with water. Anodyne ointments will mitigate the pain.

Felt, a cloth or stuff made of wool, or wool and fur, fulled or wrought into a compact substance by rolling and pressure, with lees or size. Hats, packing, lining, etc., are sometimes made of this kind of stuff.

Fence, the defensive work of an enclosure, or a protection of any kind around a garden, field, forest or any other defined and separated piece of land. Fencing is a cause of great cost and annoyance to the farmer. Besides the first cost they need yearly repairs. How to fence, what is the best and cheapest material, is always a vital question with the agriculturist. Farms should be encumbered with fence as little as possible, because it occupies valuable land that might be otherwise productive; they promote a selvage of weeds along the fields; they are an obstruction to plowing and other work requiring the turning about of teams; they bother about driving across the farm; they require the construction of gates or bars, both of which in the opening and shutting consume a great deal of time, besides constantly getting out of repair. A half mile of fence is a half acre lost for cultivating purposes. A good, lawful fence around the farm is, of course, indispensable. Pastures and barnyards must be fenced, though there has of late years sprung up an advocacy of the railing system of feeding stock, which, if fully adopted on a farm, would do away with the necessity of fences elsewhere than around the buildings for yards. In many sections of the Western States, especially west of the Missouri river, fencing is in great part superseded by tethering, herding and corraling; but as the country becomes older and more densely settled, farmers wish to pasture one part of their farm while cropping another; hence general fencing is adopted at last.

There are two general kinds of fences—those made of dead material, like wood, stone and wire, and live fences, or hedges.

The primitive fence in this country is the log and brush fence, which is constructed on timbered land by cutting down trees in line with the proposed barrier, forming a windrow, and lopping the limbs in such a manner as to make the fence complete against stock. Sometimes, where it is desired to use the bodies of the trees, brush only is used; then branches or undergrowth can be utilized.

In all rocky districts, stone fences have been used, and, besides being durable, they provide a profitable way to dispose of the obstructions upon the land.

Stump fences came into use in all timbered States when farmers began to pull the stumps by machines. They are an effectual barrier, and dispose of the stumps, but are uncouth, and occupy too much land, harboring too many weeds.

RAIL FENCES. "Snake" and straight, or post and rail, are the most common in all timbered countries. Of this kind the staked and ridered is the best. To make this kind of fence, place foundation stones, or blocks, to keep the lower rail off the ground, and then be sure that each successive rail, at the bearing, lies solidly upon, and directly over, the one below, making a secure bearing by cutting a slight notch in the top of the rail, where the next rail above is to be laid on. The rails are laid at different angles; some deflecting six feet, some seven, and some eight feet from a right line. The more they deflect, or in other words, the "crookeder" they are laid, the firmer the fence will be, but more space will be taken up and more rails required. The deflection for a twelve-foot rail is usually six feet; for fourteen-foot and for a rail a rod long, eight feet. A foot is generally allowed at each end for the lap.

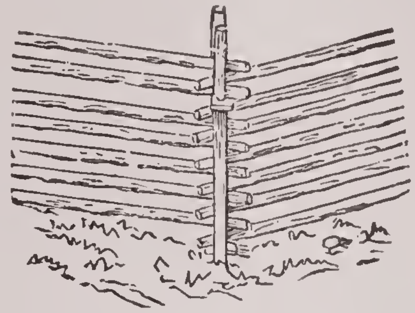


FIG. 1.

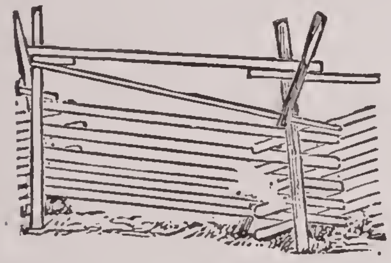


FIG. 2.

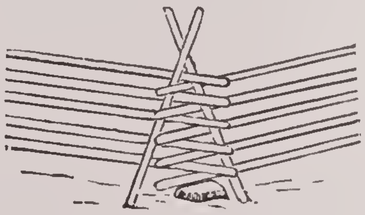


FIG. 3.

The rails of this kind of a fence are cut different lengths in different localities, even in the same neighborhood, farmers being governed by the timber they have, and the kind of ground upon which the fence is to be laid. Some cut them 12 feet, some 14 feet and others even 16½ feet or one rod in length. The ordinary lengths are 12 and 14 feet rails, and may be made of any kind of oak, black walnut, black and white oak, elm and hickory. Some fences are built 5 rails high, some 6, and some 7, the rider making an additional rail high.

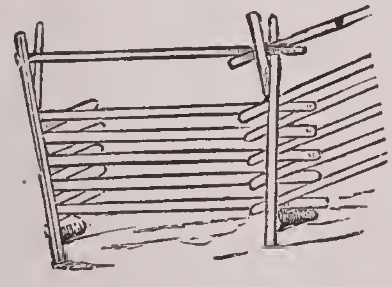


FIG. 4.

A rail fence 40 rods long, 8 rails high, requires 800 rails, the rails being reckoned at 10½ feet in length and 4 inches square, making the timber in that amount of fence equal to 10,700 feet of lumber. The number of rails, stakes and riders required to build a certain amount of fence has hitherto been pretty much guess-work; and often the farmer, before he can finish his fence, has to quit it, and go and split more rails, or gear up and haul a few more loads. The number of rails can be exactly calculated by constructing, either in fact or theoretically on paper, two such panels as are desired, and dividing the total distance, in feet, by the number of feet these panels occupy, and multiplying the quotient by the number of rails in the two panels. The following table enables one to tell within a few rails how many will be required to build a given amount of fence.

Table showing the number of rails, stakes and riders required for each ten rods of fence:

Length of rail.	Deflection from right line.	Length of panel.	Number of panels.	Number of rails for each 10 rods.			Number of stakes.	Number of riders (single).
Feet.	Feet.	Feet.	Feet.	5 rails high.	6 rails high.	7 rails high.		
12	6	8	20⅝	103	123	144	42	21
14	7	10	16½	83	99	116	34	17
16½	8	12	13¾	69	84	95	28	14

NOTE.—Should the number of rods exceed 10, the requisite number of rails, stakes and riders can be found by multiplying. For instance, should the length of fence be 100 rods, multiply the above number by 10; should it be 75 rods, multiply the above number by 7½; for 77 rods, multiply by 7 7-10, and so forth.

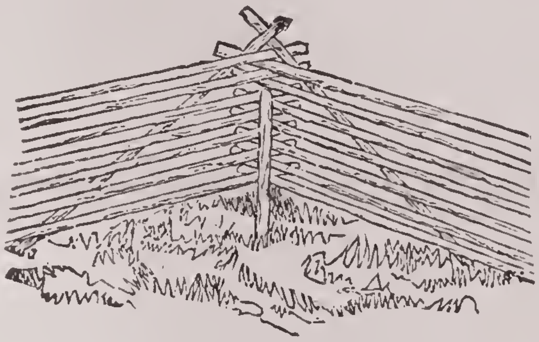


FIG. 5.

We illustrate by Fig. 1 an excellent mode of staking a rail fence. Staking the corners by projecting rails gives an unsightly appearance, and is particularly objectionable for plowing, as it considerably increases the waste of ground. More symmetry and neatness besides the saving of the ground is secured in this way. After the foundation has been put down the stakes should be driven. Holes to the depth of 20 inches should be made with a crowbar before beginning to drive the stakes.

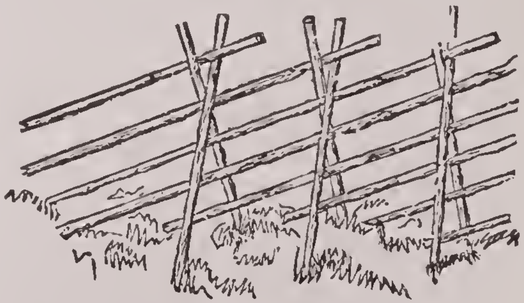


FIG. 6.

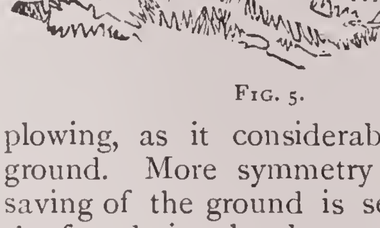


FIG. 7.

We illustrate by Figs. 2, 3, 4, 5, 6 and 7 the most approved ways of building zigzag, or stake-and-ridered fences. Fig. 5 represents an excellent plan for bracing a rail fence, whether it be staked and ridered, or staked and capped, locked and ridered, staked and wired, or wired and pinned, all of which kinds of fences are liable to be blown down by heavy winds. Place upon the inside leeward corner a piece of rail, one end resting upon the ground, the other placed underneath the third rail from the top. Fig. 6 illustrates the mode of building a rail fence upon a hillside.

Post and Rail Fences. These are perhaps more economical in the long run than the zigzag fence. They cost more but waste less land and generally last longer. The rails for these fences are cut of different lengths. A foot, at each end should be allowed for the lap. They are from five to eight rails high and the posts are set in the ground from two to three feet. We illustrate by Figs. 8 and 9 two of the best plans of building these fences.

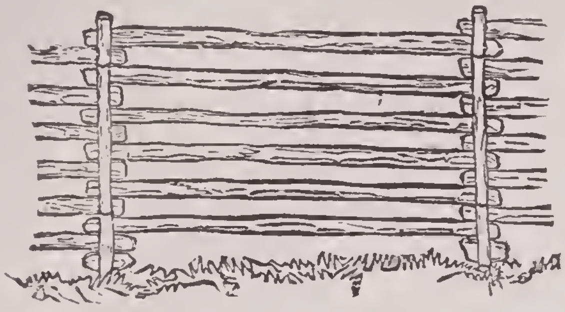


Fig 8.

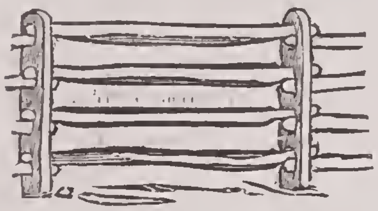


Fig. 9.

When well built they will be found to be both durable and neat: besides, they do not consume anything like the room of the zigzag fence.

Table showing the number of rails and posts required for each ten rods of post and rail fence.

Length of rail—feet.	Length of panel—feet.	Number of panels.	Number of posts.	Number of rails for each 10 rods.			
				5 rails high.	6 rails high.	7 rails high.	8 rails high.
10	8	20⅝	21	103	123	144	165
12	10	16½	17	83	99	116	133
14	12	13¾	14	69	84	95	109
16½	14½	11⅓	12	57	69	81	93

Note.—Should the length exceed 10 rods, multiply as for the preceding table.

Board Fences. These are the most common fences used upon the prairies of the West. Where timber is plenty and saw mills abound, or where lumber is cheap, post and board fences are preferable to any other. The boards are usually sawed 16 feet fong and the posts set eight feet apart. They are generally made five boards high, the uppermost space being 10 inches wide, the second eight, the third six, and the fourth and fifth five inches wide. They may vary in width, however, as cost, taste, or use may dictate. The first, third and fifth boards are joined on one post and the second and fourth joined on the next. We show by Figs. 10 and 11 two excellent styles of a post and board fence.

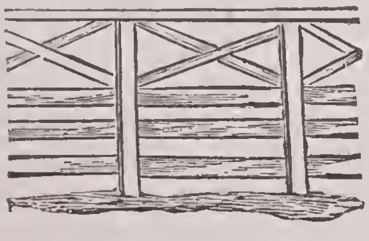


Fig. 10.

The best timber for posts in the order of its durability is red cedar, catalpa, Osage orange, honey locust, black walnut, white oak and chestnut. The posts should be placed from two and a half to three feet below the surface, in the center of a large hole and surrounded by fine stone, which should be well pounded down by a heavy iron-shod rammer, as they are filled in. The posts will not stand as firmly at first as if surrounded by dirt, but they will last much longer. The lower end should be pointed, which prevents it heaving with the frost. If the post while in the tree be reversed, or the upper end of the split section of the trunk which is used for a post be placed in the earth it will be more durable. Charring or practically burning the part of the post which is buried, will add to its duration: so, also, will imbedding it in ashes, lime, charcoal, or clay. In charring, the posts should be thoroughly seasoned and dried, else the protective process will cause decay to go on faster than if nothing had been done. Poisoning the ends of the posts by dipping them in a solution of corrosive sublimate (1 part to 50 parts of water), or by boring a hole into them and plugging up arsenic, corrosive sublimate or other subtle poisons therein, prevents decay and the working of worms and grubs.

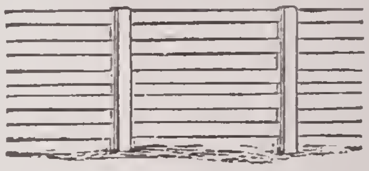


Fig. 11.

Sawed posts should be cut about the first of August and as soon as convenient and before the wood borer attacks it, taken to the sawmill and sawed into posts suitable for the fence to be built; and be sure and have some mark by which to determine which is the butt end of the post before it is treated and set. After being sawn they should be piled and thoroughly seasoned through before preparation. Then the portion to enter the ground, which is always that portion or end of the post opposite the butt of the tree, and four to six inches of the wood above the ground, should be treated as above directed or have a good thick coat of coal tar applied.

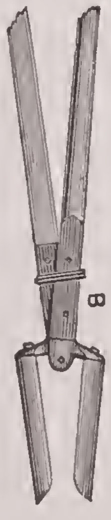


Fig. 12.—*Post Hole Digger.*

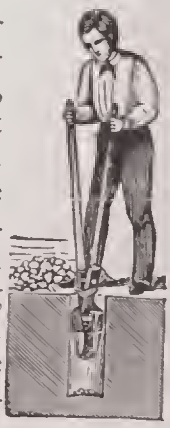


Fig. 13.—*Digger in Use.*

A post-hole digger, as illustrated by Fig. 12, is a very convenient tool to have on the farm, especially where any great amount of fence is to be built.

Fig 13 shows the post-hole digger in use. It works perfectly everywhere except in stony ground, where nothing but the spade and ladle will work. In clayey ground, free from boulders, the ground auger is in common use.

In order to find the number of feet of boards required for each rod of fence, add the different widths of the boards, in inches, together, and divide the sum by 12 for the width in feet; then multiply the width by 16½ and the product will be the number of feet, board measure, required for each rod of fence.

To find the number of posts required for a given length of this kind of fence, reduce the number of rods to feet by multiplying by 16½ and divide the product by the number of feet the posts are set apart; the quotient will be the number of posts required.

From the following table any one can calculate the cost of a board fence for any given distance. The figures denotes the number of feet, board measure.

Number of boards high.	One Mile.	One-Half Mile.	One-Fourth Mile.
One	2640	1320	660
Two	5280	2640	1320
Three	7920	3960	1980
Four	10560	5280	2640
Five.	13200	6600	3300

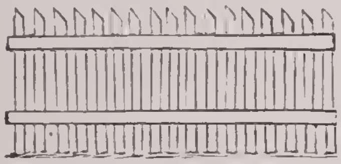


FIG. 14.—*Picket Fence.*

PICKET FENCES, except to enclose the yard about the dwelling house and in making hen parks, are but little use upon the farm, because of the expense. Fig. 14 is an illustration of a picket fence, which, when painted, will make a neat and substantial one for the yard.

HEDGE FENCES. For centuries hedge fences have been used in Europe, but they occupy considerable ground and afford a harbor for vermin. For those disposed to try them, as a matter of taste or fancy there are many kinds of thorny native shrubs that are both beautiful and hardy, for the cultivation, care, etc., of which, see Hedge.

BARBED WIRE FENCE. Among the fundamental questions in farm economy, fences are the most important, because of their extent, protection, first cost, and rapid decay. Within 15 years, and more prominently within ten years, a new material, barbed wire, has demanded public favor, with very many arguments pro and con. In the Northwestern States it has rapidly become established in the confidence of the farmers and mainly supplanted all other fencing.

The following are some of the requisites for a perfect fence:—1st. It must form a reliable barrier to the passage of stock, and must be furnished at a moderate cost. 2nd. It must be simple, durable in all places and climates, easily transported, and immediately available for a fence. 3d. It should occupy the least space practicable, thereby wasting little land, affording no harbor for weeds, and not seriously defacing the landscape.

Barbed wire comes nearer meeting all these conditions, in the larger portion of the United States, than any other material. Compared with hedge, board, or rail fences, it can claim superiority in nearly every point for a valuable fence on the farm. The main objection urged to its use is that of cruelty. It is claimed that horses, in particular, are liable to run against it and be seriously injured, if not maimed for life. If this objection is valid, and cannot be removed, then the use of barbed wire will be limited. Careful observers, however, have noted that the injury to animals has arisen from the stock being unaccustomed to wire fence, or from its faulty construction. Horses and cattle have had little respect for the ordinary board and rail fences of the country, and only the well disposed have been restrained by them. The first thing is to teach animals to entertain a becoming respect for a fence, and one that looks like a skeleton. While they are learning this lesson, quite likely some of them may get hurt; but once learned they will always regard a line of posts as very significant. Injury to stock has more frequently arisen from faulty construction than from any other cause. A majority of prairie fences are made of three wires, which is a mistake, because the distance of the wires apart offers a constant temptation to the animal.

Experience has demonstrated the practical value of the following suggestions for constructing barbed-wire fence: Set substantial posts one rod apart; the post at the starting point should be braced by cutting a notch in it two and a half feet from the ground, and running a strong pole from the notch to the foot of the second post, where it is fitted to rest firmly, and is supported about three inches above the ground by means of a short block driven down beside the fence post. This method of bracing should be repeated once in forty rods. A faulty construction would be to cut the notch in the starting post four feet from the ground, make the brace shorter, and allow the lower end to rest upon the ground; for the moment the wire is tightened upon the fence, the short brace acts as a fulcrum to lift the initial post. When the posts are set a wire is wrapped firmly around the first post, four feet and two inches from the ground; then the coil is unrolled 40 rods and the wire drawn tight by means of a set of small pulleys with grapples. After this wire has been securely stapled, a second is similarly fastened one foot below it, and a third and fourth below this, bearing a foot apart between the respective wires. Four wires thus arranged, make a perfect cattle fence. For horses, the lower wire should be without barbs to prevent cutting the knee, and a fifth wire should be blaced upon the posts five feet from the ground. The upper wire prevents accident by attempting to reach over the fence. Instead of the upper wire, a galvanized steel barbed ribbon is used, as more sightly for horses.

For swine, the fourth wire of a cattle fence is raised four inches, and two barbed wires placed at equal distances below it. For sheep, the three lower wires, as in a fence for swine, are smooth. Thus constructed, barbed wire, while uniting all the conditions of a perfect fence, is comparatively harmless. Upon the Iowa Agricultural College farm, there are nine miles of barbed wire fence, enclosing pastures upon which graze 170 horses and cattle; during the season of 1881 not an animal has been scratched to draw blood, except in one instance, and that was slight and due to a faulty construction of the fence. Barbed wire will not answer for fencing in narrow lanes and yards or any place where animals are liable to be crowded against it. Yards and lots for sheep can be made practically dog-proof by placing one barbed wire near the ground, three fence boards above, and three wires above the boards; the lower wire prevents digging, and the upper wires suggest that the dog better not climb. Within such an enclosure the grateful sheep rest in perfect security.

Barbed wire is valuable for adding to the efficiency of the older fences and hedges. We will point out how this wire may be advantageously employed in this way.

The common post-and-board fence, as commonly made, is not strong enough to resist bulls and unruly horses, which frequently tear off the upper boards. Additional strength is given by nailing a stout top board on each side of the post, and surmounting both with a strong cap-board on the top of the sawed ends of the posts. But a much simpler, cheaper, and more efficient protection is to stretch a single line of barbed wire along the top of the fence. It may rest on the top board, or run along the tips of the posts, or the top board may be omitted and the barbed wire take its place.

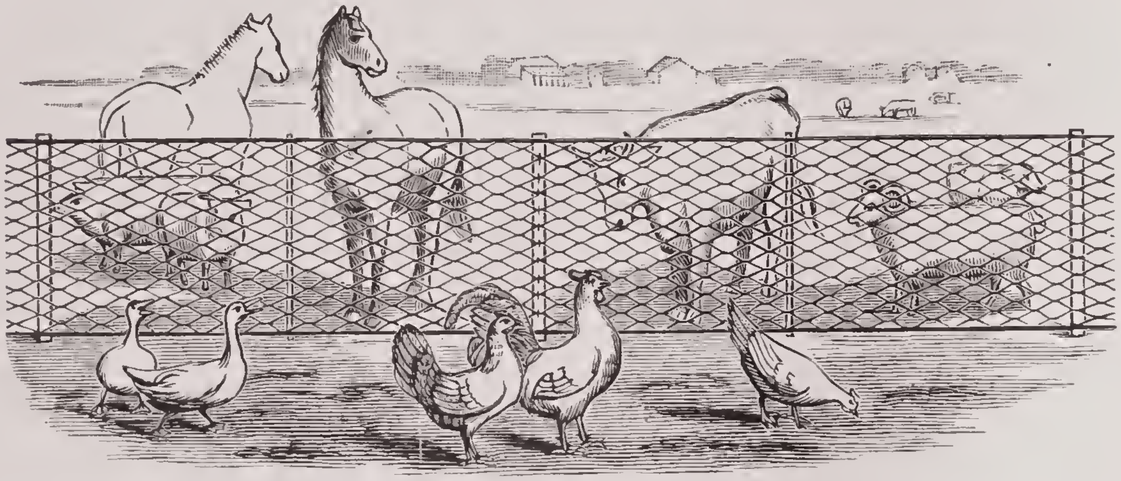


Fig. 15.—*Wire Fence.*

It is only in neighborhoods where civilization has made but partial progress that swine are permitted to run in the streets, and where tight fences below are required. In such cases a single wire just below the bottom board will be sufficient to exclude them, and such a fence will answer a good purpose for the boundaries of small hog pastures.

Many serious accidents to horses, and occasionally to other animals, have occurred where barbed wires have been wholly employed in the construction of fences. Being nearly invisible, animals have heedlessly dashed against them and become badly lacerated, and the damage has been greatly increased when they have been caught between, or been entangled in, the wires. Some additional and more visible barrier should therefore always accompany the wires. In regions where small stones are common, a ridge of these placed along under the wires and between the posts, will answer a good purpose. The adjacent fields will be improved by the removal of these stones. This line of stones need not be a regularly built wall, but they may be placed loosely, evenly and regularly. Animals dislike setting their feet on them. As the wind obtains no purchase on such a fence, and as little pressure is even exerted against it, the posts need not be deeply set, the stones about them affording additional support. This line of stones may be two feet high and three or four feet wide.

Where stones do not exist, a cheap substitute is a bank of earth. A few furrows are plowed on each side, and the earth thrown up into a smooth embankment, about two feet above the bottoms of the ditches on each side. Such a fence as this, with two barbed wires for cattle and horses, or three for sheep, is one of the cheapest and most durable that can be constructed. The posts need not be heavy; they may be placed at least a rod apart; they may be cheaply set, as deep holes are not required; the embanking is done readily with the plow; and lastly, the wires are stretched rapidly on the posts. The bank becomes sodded with grass, and, together with the ditch, will prevent animals from blindly striking the barbs.

The cheapest form of the barbed fence is where a line of trees may be used for supporting the wires. A line of maple or other shade or timber trees will answer the purpose, and the fence may be completed (with the ridge or bank of earth) when they are two or three inches in diameter.

The cost of such fences may be readily estimated by counting one post to every rod, and 50 cents a rod for the three barbed wires. The labor of construction may be reckoned at about 20 cents a rod, making the whole expense less than $1, or about 80 cents for two wires. An important item of saving is in avoiding all necessity for repairs for many years. The cost will vary with the price of posts, and with the ease or difficulty of forming the embankment of soil.

In all barbed-wire fences the wires should not extend for a distance of more than 20 or 25 rods, that the expansion by heat and contraction by cold may not be too great—the ends being secured to stout posts set at these distances apart. Galvanized wire is better and more durable than wire covered with paint.

Smooth-Wire Fence. The common smooth wire is very popular in some sections of the country. They make a neat and durable fence. A good wire fence, especially for garden and lawn purposes, is shown by Fig. 15. It is made by Sedgwick Bros., Richmond, Indiana. It is made of the best steel wire. The margin wire, i. e., top and bottom wires, run nearly straight, and are No. 9, which is common-sized telegraph wire. The body wires are No. 13. The breaking strain of No. 9 is about 2,500 pounds, and of No. 13 about 800 pounds.

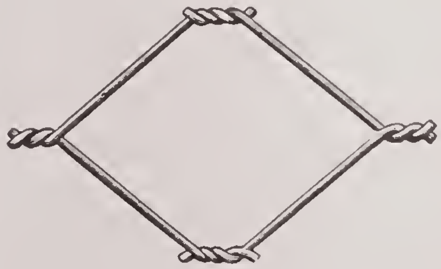


Fig. 16.—*Mesh of Wire Fence.*

Fig. 16 illustrates the general shape of the mesh and shows the twist correctly.

In making a wire fence observe the following: First, use nothing but the best material. The best galvanized wire and well-seasoned oak or cedar posts should be employed. With this material properly put up, a wire fence will last 30 years. The posts should be set from 30 to 36 inches in the ground. It will pay in the end to make a fence good. Whether barbed or smooth wire should be used we will not pretend to say positively. To make a fence hog-proof it will require one more strand of the smooth wire than of the barbed, but then the smooth wire costs less per foot, and probably the cost per rod would be about the same in either case. Horses sometimes run against the barbs, not being able to see the wires. Cut triangular pieces of tin, each side of the pieces being about two inches, and fasten them every few feet to the top strand of wire by bending the corner of the tin around the wire. The horses can easily see these pieces of tin, and these will give warning of the obstruction in their way.

To stretch the wire, bore holes in the end posts for the wire to pass through, then, having stretched the strands out along the fence, securely fasten them at one end. An easy way to stretch the wire then is to hitch a team to it. You need not be afraid of breaking it. But a better way is to drive your wagon up to the end post. Brace it so it cannot move. Then wrap the free end of the wire around the hub of the hind wheel and with the spokes or levers you can easily stretch the wire. It acts on the same priciple as the sailor's capstan. The end posts should be securely braced back from the next posts.

As any wire will lengthen and shorten with the varying temperature of the atmosphere, at one end it should pass over a pulley or smooth surface, with a 50-pound weight attached at the extremity; and this should be watched, that it be not allowed to rest upon the ground and cease its function upon the wire. If any wire is found not to be kept straight with the weight attached, increase the latter until it is sufficient.

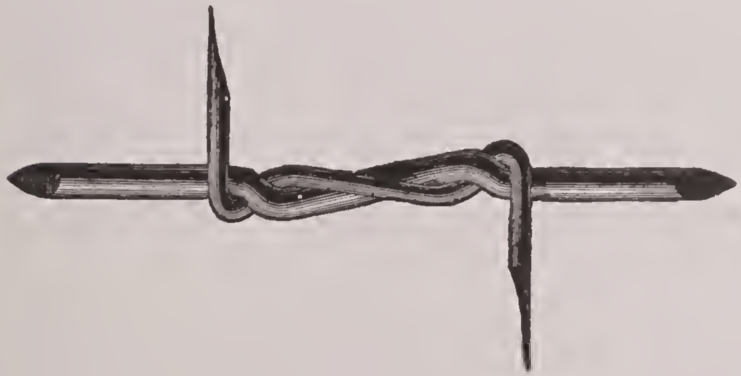


Fig. 17.—*Barbed Fence Wire.*

Within the past few years over 50 patents have been issued to inventors of the barbed wire for fences. We cannot describe them, but illustrate by Fig. 17 one among the best.

Portable Fence. Fig. 18 shows an improved portable fence, recently invented and patented by Daniel T. Hazen, of East Milan, Monroe county, Michigan. The construction of the fence is simple, being composed of panels which are interlocked on the well-known principle of a zigzag fence, but taking up much less room, and consuming much less material than the ordinary rail fence. The panels referred to are each composed of four rails or slabs, two posts, shaped triangularly and set vertically, fitting into the intersection of the panel rails, so as to make a firm and neat structure. Besides these parts, there are two vertical end pieces, one attached to the top and bottom rails, the other attached to the ends of the central rails which project for this purpose. In putting up the fence, these united projecting ends of the central rails in the one panel fit into the opening between the top and bottom rails of the next panel, and so on, interlocking the ends and forming a continuous fence. The holding together is done by means of wooden turn buttons, which are held by screws, and the turning of which makes the fence entirely portable with the exception of the short posts which are driven into the ground. For farm uses, this fence possesses peculiar advantages, especially in the division of fields from season to season. It has a full measure of strength, and combines durability with economy in material and use.

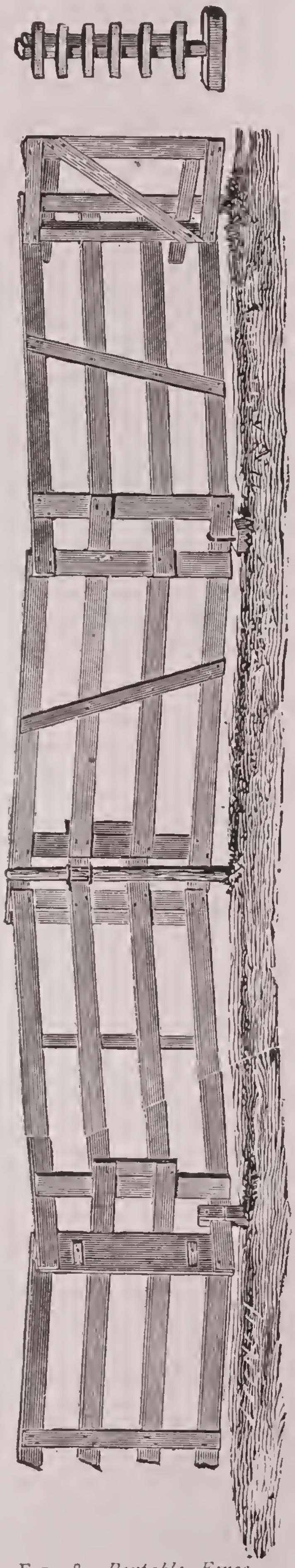


Fig. 18.—*Portable Fence.*

Flood Fence. A practical and inexpensive plan for constructing a fence across the bed of a stream, especially that of a rocky one through which the water runs only after heavy rains, is illustrated by Fig. 19. The logs are the trunks of straight trees about 18 inches in diameter, which are hewed on two sides; posts are mortised in each of these logs, and on them planks are firmly nailed. The logs are then linked together with inch iron rods, and the first one connected by means of a long link to a tree, or post firmly set in the ground upon the banks of the stream. The links must all work freely. When high water occurs, the fence is washed around and left on the bank; after the water has subsided sufficiently, the logs may be dragged back to their places, as shown in the engraving, Fig. 19, by means of a horse hitched to a staple in the end of the log.

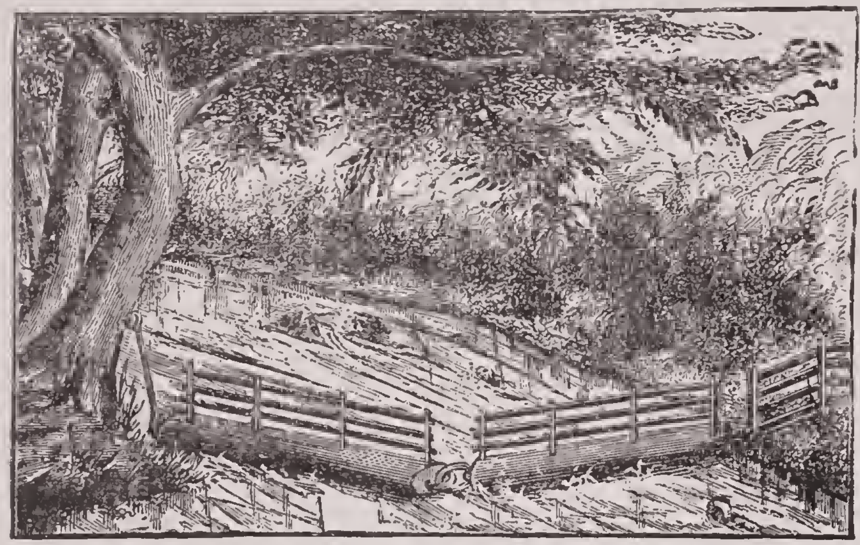


Fig. 19.—*A Fence for a small Stream.*

Fig. 20 illustrates a good flood fence to put across sloughs when they are too wide for a flood gate. The posts are driven or otherwise put down three to four feet, with the tops about one foot above ground; the other posts, that the planks are nailed to, are bolted to the top of the inserted posts, and a wire is placed over the tops. The ends of the panel that connect with the post on the bank are slightly nailed with cross strips near the top, so as to be easily broken loose when the flood comes. There are also temporary braces bearing up-stream, put in to prevent the fence from falling, but are easily washed out, when the fence falls down stream, and logs and other obstructions pass by readily. As soon as the flood goes down, the fence is easily raised, a panel at a time, to its proper place.

Fence Law. In almost every State in the Union there are laws defining what legal fences shall be. In some States the law leaves it for towns, villages and counties to define what the fence shall be, or whether there be no fences. In most of the Western States stock is permitted to run at large, and owners of land who desire to cultivate it must protect it with suitable fences of a prescribed height, five feet being the usual height. When parties have lands adjoining others they desire fenced, the law provides what is known as partition fences, each person being required to erect and maintain an equal distance of such fence. The several States have different statutes and regulations concerning them. Most of them have officials known as fence-viewers, whose offices are not sufficiently uniform to be stated generally. In all the States, however, if the parties agree about the partition fence, it is like any other contract, easily adjusted and can be enforced. It is only when the owners of adjoining lands can not agree that the law steps in for the public good and provides how persons may be compelled to build. Outside fences are required to be built and maintained by the owner or occupant of the land, if he would recover damages for loss or injury to crops or soil, except in some portions of the country, where stock is required to be kept up. This is known as a stock law. Where such a law is in force, if stock is not permitted to run at large, and it escape from the owner, he is liable for all damages. Should you be driving your stock along the public highway, and, without your fault or negligence, they break away from your control and run upon adjoining land, and you drive them out as soon as you reasonably can, you are not responsible for the damages, for you have a right to drive them along the highway, with proper care and attention. If, under such a law, persons entering your fields hunting, fishing, or berrying, and leave your bars or fence down, or gate open, and your cattle escape, you will be liable for all damages they may do to your neighbor, because the stock law requires you to keep them up, and you have a right to exclude all persons from entering. Your negligence in allowing such persons to enter makes you liable to your neighbor for the carelessness of such persons as you permit to enter your fields. This law, however, is in force only in certain localities. The genral rule is that land-owners must have and maintain a lawful fence around their premises. Partition fences can only be compelled to be built when both the adjoining owners desire to improve their lands. Therefore, if one desires to let his land lie idle and open he can not, under any statute, be compelled to contribute towards the erection of a partition fence. After such fence has been erected each person must keep his portion in repair, and if either neglects to do so, the other, after giving reasonable notice to repair, may repair the fence and recover the expense from the person whose duty it was to maintain such partition.

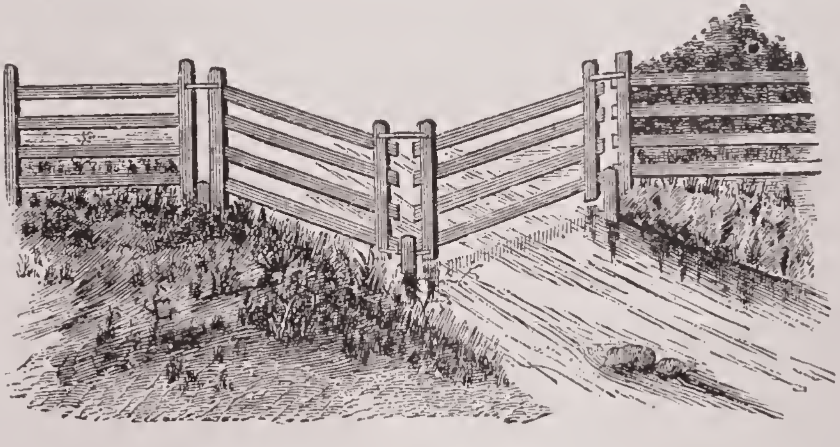


Fig. 20.—*A Flood Fence in Position.*

Ferret, an animal of the weasel family, so nearly allied to the polecat that many regard it as a mere domesticated variety. It is of rather smaller size, the head and body being about fourteen inches long, the tail five inches and a half, the muzzle rather longer and more pointed, the head rather narrower; and the color is very different, being yellowish, with more or less of white in some parts, there being two kinds of hair, the longer partly white, the shorter yellow. The eyes are pink. It is, however, much more susceptible of cold than the polecat, and requires careful protection from it in climates where the polecat is a hardy native. It was imported into Europe from Africa, and was well known to the Romans, being anciently employed, as it still is, in catching rabbits, for which purpose it is often sent into their burrows muzzled, or "coped," by means of a piece of string, to drive them out into nets, or, with a string attached to it, it is allowed to seize a rabbit in the burrows, and is then drawn out, holding it fast. The usual plan, however, is to let the ferret have free range of all rabbit holes unmuzzled. Ferrets are generally kept in boxes, and attention to warmth and cleanliness is essential to their health. They are capable only of partial domestication, acquiring a kind of familiarity with man, and submitting with perfect quietness to his handling, but apparently never forming any very decided attachment; and they never cease to be dangerous if not carefully watched, especially where infants are within their reach. If allowed any measure of freedom, they are ready to attack poultry, and kill far more than they can devour, merely sucking the blood. They generally breed twice a year, each brood consisting of six or nine. The female sometimes devours the young ones, in which case another brood is speedily produced.

Ferrule, in mechanics, a ring or band on the end of a wooden rod or bar, to prevent splitting.

Fertilization, the act or process of rendering fertile. In flowering plants this is done by the pollen of the stamen falling upon the pistil. Most plants are self-fertilizing, the stamens and pistils being in the same flower or in separate flowers upon the same plant. A few plants, as hops and hemp, have these organs upon separate individuals. Some strawberries, as Russell's Prolific, are "pistillate" (non-staminate), and cannot fertilize themselves. Other sorts, as Wilson's Albany, have hermaphrodite (or perfect) flowers, and not only fertilize themselves, but also the pistillate varieties near them. Plant fertilization is greatly aided by bees and other insects, which undesignedly carry the pollen from one flower to another, or even from the stamens to the pistil in the same flower. Some plants, indeed, are entirely dependent upon insects for fertilization. When a horticulturist desires to "cross" fertilize, he protects by a covering a flower on each of the two plants against the introduction of pollen by insects or the wind, and, at the proper time, by his own hand, he transfers the pollen of the one to the pistil of the other. In the meantime he had plucked out the stamens from the flower he wished to fertilize to prevent self-fertilization. The product expected is, of course, a combination of two or more good qualities in one plant. The subsequent propagation of such new variety must be by cuttings, graftings, etc.,—any other method than by seed. See Varieties.

"Fertilization" of the soil consists in supplying it with such chemicals as disintegrate and render available sundry mineral and vegetable materials of plant nutriment. See next article.

Fertilizers. These are chemical and semi-organic substances which dissolve the plant-food in the soil and render it available by the growing plants. They also add to the soil a little of the ash element of plant food. They have a tendency, in the long run, to exhaust the soil. They comprise ashes, lime, marl, gas lime, gypsum, bones, common salt, many of the basic salts, guano and soot.

The quantity of ashes which should be applied to the acre depends upon their strength, on the soil, and on the character of the crops cultivated. Clover, lucern, peas, beans, the grasses, and all the root crops are great exhausters of the soil. For them, ashes and bone dust are the best fertilizers; and, for clover, peas and roots, their effects are much enhanced when mixed with gypsum. Rich lands require a heavier dressing than light soils. For the former, 30 bushels of unleached ashes per acre is not too much; if leached, apply 45 bushels to the acre; light soils require about half as much. Of course, unless vegetable and mineral manures are correspondingly supplied to the soil, the fertilizers will cause it to be entirely exhausted. Ashes may be applied to meadow lands for a longer time than to any other crops. Coal ashes are of some value, especially to aid in the mechanical division of heavy soils. Peat ashes are more valuable.

Lime, next to ashes, whether simple or as a carbonate (chalk) or sulphate (gypsum), is the most valuable among the saline manures; and, like ashes, too, its application is beneficial to every soil not already sufficiently charged with it. It makes heavy land lighter, and light land heavier; it gives adhesiveness to creeping sands or leachy gravel, and comparative openness and porosity to tenacious clays; in short, it is chiefly a mechanical agent, and has the remarkable office of catching and holding the more volatile elements of plant-food until they are wanted by the crops of the farmer. It may be carried to the field immediately after burning and placed in small heaps, where it may be left to slack by the rains and the air; but it is better to reduce it at once with water, if convenient, and then spread it preparatory to plowing. A good practice is to place it in large piles and cover it thickly with earth, which gradually reduces it to powder. It may then be carried where it is wanted and spread from the cart. When small quantities only are wanted, the best plan is to air-slack it thoroughly and add it to the compost; but in this case the heap must be spread upon the field before fermentation commences, or covered with a thick coating of earth to retain the ammonia, as this element is rapidly expelled by the action of lime in fermentation. Fresh-burnt lime does not act on the crops during the first year, and it may be prepared for action as well by mixing it with three or four times its bulk of earth as by spreading it directly upon the ground. Magnesian limestone may be applied with benefit in large quantities, the average for first dressing being from 50 to 120 bushels per acre, which may be renewed every four or six years at the rate of 20 to 40 bushels. If too much is applied, putrescent or green manures are the only correctives.

To give lime its fullest effect, it should be kept as near the surface as possible; therefore, apply it after plowing, harrow it in, and then allow the ground to remain in grass as long as possible; or, if the land is not devoted to grass, apply the lime as soon as possible after a crop is taken off, so as to allow plenty of time for its action before the next planting. Lime is useful to meadows in destroying the mosses and decomposing the accumulated vegetable decay or the surface. For this purpose it may be spread on them unmixed, after having first passed into the state of carbonate or effete lime, to prevent injury to the grass; but if no such necessity requires its use in this form, it may be combined advantageously with the muck and scattered broadcast over the meadow. Land producing sorrel or dock is said to be "sour," and should have lime added, but not gypsum.

The marls derive their principal value from the lime which they yield, a portion of which is sometimes in the form of a phosphate. They are adapted to the improvement of all soils not already filled with lime, and they are generally more useful to meadows than the pure carbonate. From 20 to 400 cart-loads of marl per acre have been applied, according to its quality and the character of the land to be benefited. It should be carried out and exposed in small heaps to the sun, and especially to the frosts of winter, before it is spread upon the land.

Gas lime is the spent lime of gas-works, and is a useful top-dressing for soils requiring lime or gypsum. It may be drawn out in the fall or winter season, and if not intended for composts, dumped in small heaps, and especially, if fresh, it should at once be spread upon the surface so as to be well exposed to the air. It may be applied either to grass or plowed crops with equal benefit, operating in much the same way as gypsum, although it should be spread in several times the quantity per acre. Caution must always attend its use, for without several months' exposure it exercises a poisonous influence upon vegetation.

Gypsum, or "land-plaster," as it is sometimes called, is the sulphate of lime, and a very popular fertilizer, its best effects being on sandy, loamy and clay soils, the latter requiring more than the others. Some soils, especially the prairies of the West, do not seem to need it. The following is a good summary of its qualities: It acts best in dry soils and in moderately dry seasons; it is inactive, or at least fails to give the best results in soils deficient in vegetable mold; it tends to dissipate the vegetable matter in soils by promoting oxidation; it benefits plants by directly supplying sulphur and lime, and by indirectly supplying potash and magnesia; it fixes or converts the volatile carbonate of ammonia into the non-volatile sulphate of ammonia; its office in preventing the waste of carbonate of ammonia in the stable and in fermenting manure is much more important than in fixing the ammonia of the atmosphere; it increases the development of leaves and stalks, without a corresponding increase of seed; it is markedly beneficial to clovers and all leguminous crops; as plaster is of sparing solubility in water, a comparatively small dressing is as beneficial as a very large one; a hundred weight is as good as a ton, so far as the crop is concerned to which it is applied; since plaster is rapidly washed out of the soil by the heavy rains of fall and spring, it is best to apply the plaster to the crop we wish to benefit in the quantity which that crop requires, and at the time it is found to do the most good, viz.: in the early spring growth. There is great diversity of views among farmers in regard to the influence of plaster on Indian corn. Although corn ranks second or third as a market crop, yet for use upon the farm it stands first in importance among our grains. All doubts in regard to the influence of so important a manural substance on a leading crop should be solved by accurate, careful, and repeated experiments by farmers in all parts of the country.

Two pecks may be applied per acre of sandy soil, and 15 bushels per acre of clay soil; but the usual quantity applied is two to four bushels. The crops upon which it produces the greatest effects are the red and white clovers, lucern, sainfoin, and other leguminous plants, as peas, beans, etc. On natural meadows and on cereal grains it has no perceptible influence. It should be sown broadcast as soon as the leaves of the earliest trees have expanded in the spring. It requires an abundance of rain to properly dissolve it and incorporate it into the soil. For corn, potatoes, turnips, etc., it is usually put in with the seed, or sprinkled upon them after the first hoeing. It is a great exhauster of the soil, and one should first try his land carefully with it on a small scale. At Dowagiac, Mich., and possibly other places, a "plaster-sower" is made, at a cost of $40, which will do the work of a whole neighborhood in good style.

One part of Paris green to 60 of gypsum makes a good protection against the potato-beetle.

Bones, to be of the greatest value, should be crushed or ground, without having been previously burned. Before their manipulation for this purpose, however, they are generally boiled for the oil and glue in them. This does not lessen their agricultural value very perceptibly. Bone-dust is particularly applicable to pastures. It is sown broadcast upon the surface at the rate of 50 to 100 pounds to the acre.

Old lime plaster from the walls of buildings is often worth twice its weight in hay, as it, when sown broadcast upon a meadow, increases its fertility for years without any further treatment.

Guano is the hardened remains of the dung, feathers, eggs, food, and carcasses of innumerable flocks of marine birds, which refuse has been collecting for ages on some of the islands of the sea. It is a valuable fertilizer, especially near the seaports, where it can be obtained more cheaply than inland. It is applied to all kinds of crops; for grass it is used as a top-dressing. It is first mixed with twice its bulk of fine earth, ashes, plaster or charcoal dust, and the proper quantity is 200 to 400 pounds per acre, sown broadcast and harrowed in, or supplied in two dressings, the first soon after the plants appear, but not in contact with them; the last, 10 or 14 days after and immediately before moist or wet weather. Rich lands have in some cases been injured by it. For hot-houses and many minor purposes it is a desirable manure, and in solution it is very convenient as an occasional dressing. It is thus prepared by dissolving one pound in three gallons of water 24 hours before using. It is somewhat volatile, and therefore should be kept closely covered until used.

Soot is valuable in wet seasons. It is applied at the rate of 50 to 300 bushels per acre, sown broadcast and harrowed in. Salt increases its value. Its use, however, has been so limited in the West that the few contradictory reports which reach us do not justify us in being very positive concerning its value.

The salt should always be applied as a top-dressing, for wheat and rye either alone, or mixed with guano or nitrate of soda; for barley, oats, clover and the grasses, apply in May or June in dry seasons; in gardens and orchards, sprinkle a strong solution when there is mildew; for the root crops, hops, and flax, use in dry seasons after the plant is fairly up, alone or with guano. For all the grains, root crops, beans, peas, flax and hops, apply either a month before or a month after seed time; for gardens, orchards, and meadows, in the fall; for clover and the grasses, a month before seed time, and for fallows, at the time of breaking up. According to some, the chief value of salt as a "fertilizer" is to draw moisture during dry seasons. It is said also to aid in destroying worms. Salt should be applied to fruit trees in trenches on each side of the tree, at the rate of four pounds to the tree. It is applied to hay at the rate of 10 to 20 pounds to the ton at the stacking. It should never be applied with the seed, or on very cold, wet, undrained land. In composts, at the rate of 100 pounds per load.

The phosphates are generally insoluble in the water of the soil, and hence many manufacturers add sulphuric acid to it, forming a "superphosphate," in order to render it soluble; but eminent authorities declare that this is unnecessary, and is only an excuse for throwing into the market a high-priced article. The phosphates furnish phosphoric acid to the crops, on an average about one pound to 13 of potash. The grains are pre-eminently phosphoric-acid crops, while forest trees and the coarse grasses are potash. The only three essential elements of a fertilizer are phosphoric acid, potash and ammonia. A grain of wheat, for example, contains, in 1,000 of its mineral parts, 298 of phosphoric acid, 137 potash, 120 of magnesia, 91 soda, 28 lime, 15 silica, 7 of peroxide of iron, and 3 of sulphuric acid. It stands the farmer in hand, when he buys a fertilizer, to get these in the cheapest manner, and not pay out enormous sums for material he has already in his soil. For instance, the selling price of one brand of silicated superphosphate is $45 a ton, while its actual value is only $17.50; the price of double refined poudrette is $25 a ton, while its actual value is $8.50 a ton. Price of ammoniated bone, $48 a ton, actual value $13.26; Russell Coe's superphosphate $60, actual value $33.50 to $34.50; Wilson's superphosphate, price $55, real worth $23 to $25. The high-priced fertilizers do not pay the farmer, especially in the Northwestern States.

To apply superphosphate, for corn or potatoes, put one or two tablespoonfuls to the hill, mixing thoroughly with the soil; or it can be drilled in with the corn at the rate of 200 pounds to the acre; for wheat, 150 to 200 pounds to the acre; for oats and barley, 100 pounds to the acre: for grass, 100 pounds, either late in the fall or spring. But different soils, of course, require different variations from the foregoing.

Superphosphates can be manufactured at home by getting up a sufficient quantity of dry bones, making a large heap, mixed with dry pine wood, and burning the whole mass to ashes. Pound and sift till the ash is reduced to a powdered mass. Now have ready a box, water tight, of suitable dimensions, into which put the bone ash and add sufficient water to wet the mass thoroughly. Then take the brown acid of commerce, and to every gallon add about four gallons of water. Pour on the moistened bone ash this diluted acid, slowly, keeping several hands stirring with wooden paddles. Continue to pour on the acid until the contents of the box becomes a semi-fluid mass, and all effervescence ceases. One carboy of acid might be used on 300 pounds of bone ash. But it would not pay a Western farmer to resort to this proceeding. There are mills for the purpose of grinding bones, but no one farmer would likely have enough bones to warrant the purchase of machinery, and it is hardly probable that an entire community would have. In absence of a mill, bones can be reduced by making a compost with good wood ashes, although it requires considerable time to do it. The process is to place a layer of bones in the bottom of a barrel, and then over them place a layer of ashes, and so on, until the barrel is filled or the bones are exhausted. This should then be kept wet all the time. The mixture will be ready for use in about a years time. When softened, take the bones out and crush them before applying to the land.

As a general rule concerning the application of fertilizers, top-dressing is better: but all volatile fertilizers and manures should be plowed or harrowed under immediately. The stronger the smell, the more rapidly are the virtues of a manure or fertilizer wasting away.

It is useless for a farmer to go to an agricultural chemist for a prescription of fertilizers for his farm; he must feel his way along by careful experimenting.

The various manures are also spoken of as fertilizers, especially clover. See Manure. Red clover is the best, of which about 12 bushels of the unhulled seed is sown to the acre. Summer fallowing should be done the second year, taking the first crop off and turning under the second.

Directions as to the quantities of salt and the time to be applied to different grain, roots and other crops:

Crops.	Cwt. Per Acre.		
	Light sandy soil.	Middling loamy soil.	Heavy rich loam or drained clay.
Wheat	4½ - 5	4 - 4½	3 -4
Rye	5 - 6	4½ - 5	3 -4
Barley	6 - 7½	6 - 6	4 -5
Oats	6½ - 7½	6 - 6½	4½-5
Beans and peas	6 - 6½	4½ - 5	3½-4
Rape seed	6 - 7	5 - 6	4 -5
Flax	4 - 5	3½ - 4	2½-3
Hops	6 - 6½	5 - 6	4 -5
Potatoes	6 - 7	4 - 5	3 -3½
Turnips, mangolds, beets and carrots	5 - 6	4 - 5	3½-4
Gardens	7½-10	7 - 8	6 -6½
Fruit trees	....	....	....
Fallows	9 -10	8 - 9	7½-8
Clover and grasses (artificial)	6½ - 7½	5 - 6½	4 -5
Meadows and grasses (natural)	6½ - 7½	5 - 6	4 -5

These quantities are calculated for soils in which there is an insufficiency of the elements of salt; but in such soils where an analysis would already show considerable quantities of soda and chlorides or muriates in various forms, smaller quantities than the above should be used, as also in the cases where salt has already been used in compost and with stable dung, or where cattle are regularly fed salt.

Fescue (fes´-cu), the name of a genus of grasses, of which there are several well known useful species, as meadow fescue, hard fescue, sheep's fescue, etc.

Fetlock, the part of the horse's leg where the tuft of hair grows, behind the pastern. The joint of this part is called the fetlock-joint, and is the principal seat of motion below the knee. Four bones belong to it, the cannon, the long pastern bone, and the two sesamoids; an extraordinary provision exists in its configuration and accompaniments to obviate concussions. Inflammation in the ligaments of this joint attends most cases of sprains of the back sinew; and inflammatory action in these ligaments or in the parts immediately connected with them is frequently mistaken for sprain in some higher part of the leg.

Fever, a general inflammation, which may arise from various causes, affecting persons of different constitutions more or less violently. This should prompt every one to look well into the constitution of the patient before giving remedies. Should the same active treatment be employed for a weak and delicate person that would be used for a healthy, robust one, the result would doubtless be disastrous. The cause of the fever should be known, if possible, as the treatment may be more intelligibly prescribed. Fevers are often aggravated in their virulence or protracted in their duration by wrong medication.

As to the particular form of fever, whether bilious, nervous, typhoid, remittent, intermittent, rheumatic, malarial, scarlet, spotted, erysipelas, small-pox, or something else, it is generally difficult to tell for the first day or two, but this makes no difference with the home treatment prescribed below. These fevers, with their treatment, are treated under their respective heads. The symptoms of fever are lassitude and weakness of muscular power, accompanied with an expression indicative of some inward distress; and an aversion and inability to every exertion, either of mind or body, usually denote the approach of fevers. Irregular chills and heats, with great restlessness, and a general sensation of soreness, succeed; while flushing of the face, increased heat of the skin, especially of the hands and feet, quick pulse, headache, or a disturbed condition of the mental faculties, demonstrate that the fever is already formed, and that medical assistance should be rendered to the patient.

All fevers have a tendency to be higher in the latter part of the day and reduced in the morning. Those which entirely remit (that is, cease) on alternate days, are called "intermittent." Some intermittents, however, have both their quickening and cessation daily, and some, very rare, every three days. "Ague," "chills and fever," etc., are other names of this form of fever, and it is always more or less bilious. Those fevers which only partially cease, daily or on alternate days, are denominated "remittent." Sometimes this form of fever is also bilious, and sometimes nervous. Both the intermittent and remittent are "malarial," as is also typhoid. In times of small-pox, if one feels chilly, with pain in the back and head, he should suspect that dreaded epidemic and act accordingly. Very few persons, not doctors, are willing to take the responsibility of treating fevers, except the intermittent form, termed ague, when the favorite quinine, or hot bathing, or hot herb teas will be called into requisition.

For treatment in the early stages of fever, or until the particular type is developed, it is generally recommended by the profession to keep the head cool by bathing and fresh air; the feet warm, if they are not already hot. Give injections to clean out the bowels. If there is nausea, give an emetic. Give no food, but give drinks of pure water of such temperature as is least nauseous to the patient, which may be a little flavored with cream, sugar, juice of sour fruit, or some innocent aromatic. Further than this, let him rest, or even sleep, all he wants to.

Field, a division or a subdivision of a farm. Each field on a farm ought to have a distinctive name and the different fields of a farm should be in succession managed in a strict and regular adaptation to a systematic course of cropping.

Field Mouse: see Mole.

Fig. This celebrated fruit-tree, whose history is as ancient as that of the world, belongs properly to a warm climate, though it may be raised in the open air in the southern portion of the Northern States, with proper care. In its native countries, Asia and Africa, near the sea-coast, it forms a low tree 20 feet in height, with spreading branches and large, deeply lobed and rough leaves. The blossoms are scarcely visible, being concealed in a fleshy receptacle which finally becomes the fruit which is eaten. This is very sweet, and of such peculiar richness and flavor that some persons do not like it at first; but it is nevertheless a very nutritious article of diet.

CULTIVATION. This tree is very rapidly increased by cuttings taken off in March and planted in a light soil in a hot-bed; or they may be planted in a shady border in the open air quite early in April, with tolerable success. The cuttings should be eight or ten inches long of the last year's shoots, with about half an inch of the previous year's wood left at the base. The best soil is one moderately deep, neither very moist nor very dry. In very moist ground the tree will run to coarse wood, and in dry ground the fruit will drop before fully ripe. In this climate a loamy, chalky or limy soil is the best, with marl or mild lime in compost as a suitable manure. In the Northern States the tree is kept as a kind of dwarf, in order that it may be carried in-doors or otherwise protected during cold weather. One good method is to set open boxes or barrels over them, filling in with straw or any other litter. In order to prevent a too luxurious growth of the branches under this process of dwarfing, "root-pruning" has to be resorted to. Short-jointed wood and only moderate vigor of growth are well known accompaniments of fruitfulness in this tree; and there is no means by which firm, well ripened, short-jointed wood is so easily obtained as by an annual pruning of the roots, cutting off all that projects more than half the length of the branches. This work is done in autumn by digging a trench around the tree, cutting off all the roots with a sharp spade; then but little pruning of the branches is necessary beyond that of keeping the tree somewhat low and in regular shape, shortening in the branches occasionally and taking out old and decaying wood. In winter the branches of the fig should be bent down to the ground and fastened with hooked pegs, and covered with three or four inches of soil as in protecting the foreign grape. This covering, of course, should be removed as soon as the spring is well settled.

Two crops in a year are usually produced by the fig, the first, which ripens here in mid-summer, and the second, which is yielded by the young shoots of the same season, but rarely ripens well in the Middle States. It is therefore advisable to rub off all the young fruit of this season's crop after mid-summer as they are formed. In an unfavorable soil or climate the ripening of the fig is undoubtedly rendered more certain and speedy by touching the eye of the fruit with a little oil; the fruit is also larger.

VARIETIES. Of the red, brown or purple figs the most hardy varieties are the Black Ischia, Brown Ischia, Brown Turkey, Brunswick, Small Brown Ischia and Violette; and of the white, green and yellow kinds, they are the Angelique, White Ischia and Pregussata. The very hardiest is the Brown Turkey, and the most luscious varieties are too tender for culture in the Northern States.

Fig, IN FARRIERY, an excrescence on the frog of a horse's foot resulting from a bruise.

Filbert, a large, thin-shelled hazelnut, raised in England and on the continent of Europe, and in California. The climate of the northern portion of the United States is hardly adapted to their culture.

File. In using a file, it saves its surface to draw it back lightly. In filing a flat surface, great care must be taken if you would avoid filing the edges more than the middle. Applying another perfectly level-faced iron which has been evenly coated with red lead, will show up the places not sufficiently filed down. Files can be re-cut with acids, in the following manner: First cleanse them in warm water in which is a little potash; rinse with warm water and dry by artificial heat. Put them in warm water, just enough to cover them, and to each pint of the water add 2 ounces of blue vitriol finely pulverized, 2 ounces of borax, well mixed, taking care to turn the files over, so that each may come in uniform contact with the mixture; then add 7 ounces of sulphuric acid and ¼ ounce vinegar, which will cause the files to look red, at first, but they will in a short time resume their natural color. Then take them out and wash them in cold water, and dry them by artificial heat. Sponge them with olive oil, wrap them in porous paper and lay them aside for use. To clean a file, oil and heat it, and rub it off with a wire brush. To temper a file, grind out the cuttings on one side until a bright surface is obtained; then damp the surface with a little oil, and lay the file on a piece of red-hot iron, bright side upwards; in about a minute the bright surface will begin to turn yellow, and when this color has deepened about the color of straw, plunge the file into cold water, and the work is done.

Fillet, OF VEAL, is the fleshy part of the thigh. To cook, see Veal.

Filly, a female colt, or young mare.

Filter, an apparatus for purifying water. To make an exceedingly cheap and simple filter take an oak or maple tub or cask, put into the bottom 3 or 4 inches of soft brick, pounded up about as fine as coarse salt; over this put as much fresh-burned charcoal, pounded up to the same grade, and over this another layer of the brick, and on the surface a good, clean cloth strainer, so arranged that no coarse matter will waste around it and get through; or it may be tied over the top of the vessel. Have a wooden faucet as near the bottom of the tub as possible, and a jug underneath to catch the water. Clean, fresh-burned soft brick, pounded up, is far more efficient than pebbles or sand. Old charcoal will leave a rank or bitter taste in the water.

A filter for a cistern might be made on the same principle, but on a larger scale, and placed at one side near the top of the cistern, just under the surface of the ground and in the course of the rain-water, so that all the latter will have to go through it to reach the cistern. A cistern filter made in this way cannot be used in freezing weather, unless it is under the house, which is a bad place for a cistern. A cistern filter which is not subject to freezing, and is cheaper, although not so efficient, is made as follows: Build a four-inch brick wall across the cistern from bottom to top. This is laid in cement, and curves to the side which is to receive the water, which should be about two-thirds the capacity of the entire cistern. The water will filter through the brick of the partition, and may be drawn pure from the smaller compartment. A good method is to make a small cistern, adjoining the main one, five feet wide by six feet deep, connected, about a foot above the bottom, with the large one by a pipe. Fill the small cistern two-thirds full with sand and gravel, charcoal or brick dust, and let the water from the roof be discharged into it, and filter through into the main cistern. The advantage of this method is that when the filtering materials get old or too impure, they may be taken out and renewed, without disturbing or losing the water in the main reservoir. A common method is to place a bisecting, single brick wall in the cistern, from bottom to top, laid without mortar.

Every filter ought to be renewed every few weeks, whether it cleans much water or not for the reason that the brick and charcoal gathers foul gases and insects when not in use, and when in use it gathers the foul matter of the water.

Fin, the cutting plate on the colter of a plow.

Finger Bar, that portion of the cutting bar of a mowing or reaping machine in which the knife bar works.

Finger Glass, a glass to hold water for the use of the fingers at the dinner table.

Finger-Nails. Keep them clean by the use of the brush and soap-suds, and trim then once a week with a knife or scissors; don't bite them off, nor scrape them. Do not trim the corners very close, lest they grow inward and make trouble.

Finger-Plate, a strip of metal or porcelain on the edge of a door to prevent the fingers from soiling the paint.

Finger-Rings. When on a little too tight a finger-ring may be slipped off comfortably by soaking the finger in a strong lather of soap-suds from the ring down to the next joint. If on too tight for this process, the next thing to do is to wind on a thread from the same joint up to the ring, as carefully as on a spool, and pass the end under the ring with a needle; then unwind by passing this end around the finger underneath the ring, and the latter will very gradually be worked off. If too tight to be slipped off by either of these processes, corrode it in two with aqua regia, to be had at the drug-stores.

Fining (fi'ning), a process of refining, as liquors with isinglass or gelatin. See Ale, Beer and Cider.

Fir (fur), a tree of the spruce genus. The Scotch fir is a pine. See Evergreens.

Fire. In the first place there should be a permanent and definite understanding in the family what to do in case of fire, both as to each one's own person and as to the care of the property, so that in case of a sudden emergency there will be some wisdom of action. Flues and ash-barrels are the most common sources of fire about the premises in the country. They are very deceivingly treacherous. You cannot take too much pains with them. When a chimney takes fire within, throw some sulphur on the fire below and close up the chimney way with a wet blanket so that the flames cannot come out into the room. Salt is also a good extinguisher. To pass through a room of dense smoke and heat, crawl along on the floor, and, if possible, have at the same time a woolen cloth over the mouth, which will serve as a filter to the air you breathe. When clothes take fire, smothering the burning place with a woolen cloth or blanket is by far the best method; the next is to do anything else that may smother the fire. When children's clothes take fire they should be taught not to run, as that would increase the flame, but immediately snuff it out, or smother it in some way. The cotton and linen clothes of children should always receive their last rinsing in water which has two or three ounces of alum dissolved in it; that will render the garments almost incombustible. When any kind of oil or grease is on fire do not throw water upon it, but smother it if practicable, —otherwise, protect the things around until the oil has burned out. The rooms in which a fire is under way should be closed, so that the fire will not have much ventilation. When one is in an upper room during a fire and cannot get down by the stairway, he should tie sheets together, if he can get them, and tying one end to a bed-post climb down by the sheets from a window. All paper and cloths in places exposed to fire, may be protected by a solution of alum or salt. In extinguishing a fire which is under full headway, it is best to advance ahead of it and wet the places it is about to attack, rather than spending all the force on the middle of the conflagration, where it is too late to do any good.

Fire-Blight, a disease of apple and pear trees. See Apple, page 20.

Fire-Board, a chimney board used to close a fire-place in summer.

Fire-Brick, a brick capable of sustaining an intense heat without fusion. It is usually made of fire-clay.

Fire-Clay, a kind of clay, chiefly pure silicate of alumina, capable of sustaining an intense heat, and hence used in making fire-brick.

Fire-Damp: see Choke Damp, page 239.

Fire-Dog, andiron; a support for wood in a fire-place.

Fire-Irons, utensils for a fire-place or grate, as tongs, poker and shovel.

Firing, the application of the firing-iron to the diseased parts of the bodies of domestic animals, particularly the horse. It is a severe and very painful practice, and in consequence of its having been much abused or unnecessarily resorted to by bungling and cruel veterinarians, it has fallen into great disrepute. The Arabs use the firing-iron as a sort of panacea for horse diseases, and only those that are akin to them in moral nature will follow their barbarous example in its indiscriminate use. In some cases good veterinarians claim that it really exerts great therapeutic power, while others claim it does no good whatever. When Prof. A. Liautard, of the American Veterinary College, was queried in reference to firing he gave the following reply: The operation of "firing" is one to which Americans often object in the treatment of diseases, and owners of horses very often refuse to have their animals submitted to it. The objections are made both on account of the blemishes which may follow, and for the failures which have often followed the treatment. Marks cannot be avoided; in fact they are a necessary consequence of the operation, if it is properly done, unless the firing is very light. The failures are not necessarily due to the inefficiency of the operation, but more frequently to the incomplete manner of its performance. Of course we would not convey the impression that all cases will be followed by certain recovery after the application of the actual cautery, but our long experience justifies us in saying that in the immense majority of cases it has either brought cure, or at least great relief; and we know many cases of lameness, for instance, where all other treatment had failed, in which "firing" was followed by the most satisfactory results.

"Firing" consists in the proper application to living surfaces of a high degree of heat, which will irritate or even destroy those surfaces, either superficially or deeply.

According to Prof. Bouley, the cases in which "firing" may be used are quite numerous. He recommends it in diseases of the joints, when bony deposits are developed on the borders; in injuries of ligaments; in diseases of bones, of tendons, of muscles; and in some nervous affections. Still farther, he advises its use as an auxiliary in pneumonia, pleurisy, etc.

The reader will see from this that "firing" is employed with very different objects. Several modes of "firing," are used; that known as the "Objective Firing" is where the caloric is transmitted to the living parts by radiation, and not by direct contact of the heated instrument. It is a dangerous mode of operation, which requires a great deal of care, else it may be followed by ugly wounds, which may leave bad blemishes.

"Transcurent Firing" is the one most commonly used, and is performed with special-shaped instruments called "irons," or "cauteries." Some are knife-shaped, and others pointed. Hence the cauterization in one case is in lines, and in the other in points and dots. The lines are used principally for large surfaces, while the dots or points are used upon limited spaces. These are preferable, as they leave fewer marks afterwards.

A third mode of "firing" has recently been introduced into veterinary surgery, known as "Needle Firing." This is different from the second mode of operation, as the instruments are fine needles, which are introduced while hot, through the skin, and sometimes through the tissues underneath. In cases of large bony growths most advantageous results have been obtained from this method. The operation, when properly applied, requires no other application than that of the red iron; it is, however, customary in America to join to it blistering. This, however, could be well dispensed with, if the "firing" was properly done. The following are the unfavorable results which may follow "firing," and are of so little importance that they will by themselves show how little risk there is in the operation:

1. Section of the skin, if the iron is applied too hot and heavily, healing rapidly.
2. Bleeding, when the instrument used is rough and sharp, and pressed too hard on the skin; this is generally harmless and stops of itself.
3. Tearing of the scabs by carelessness in the attendance after the operation.
4. Sloughing off of large pieces of skin, when the "firing" has been too deep, or when greasy substances are used in connection with the operation.
5. Irregular blemishes or cicatrix, results of the above accidents, which it is impossible to remove; and which ought not to take place at the hands of a skillful operator.

Firkin (fur′-kin), a measure of capacity, being the fourth part of a barrel, or about eight gallons; also, a small vessel or cask of indeterminate size, used chiefly for butter or lard.

Fiscal, pertaining to the period of accounts; as, "fiscal year," the year of opening and closing an account or report, which is made by the year.

Fish, one of the four great classes or primary divisions of vertebrated animals; and although the lowest form of vertebrates, their varied forms and colors, which often rival those of precious stones and burnished gold, the wonderful power and velocity of some, the wholesome food furnished by many, and the exciting sport of their capture combine to render fish subjects of greatest interest to the casual observer, as well as to the amateur and professional naturalist.

Of all vertebrates the fish is the simplest in its structure, and the great geologic book of nature shows us, on opening its rock leaves, that it is the oldest. The organs of fishes are adapted to living under water. In place of lungs they have gills. Instead of four legs like animals, or two legs and a pair of arms, they have two pairs of fins, called branchial and ventral. (Toes

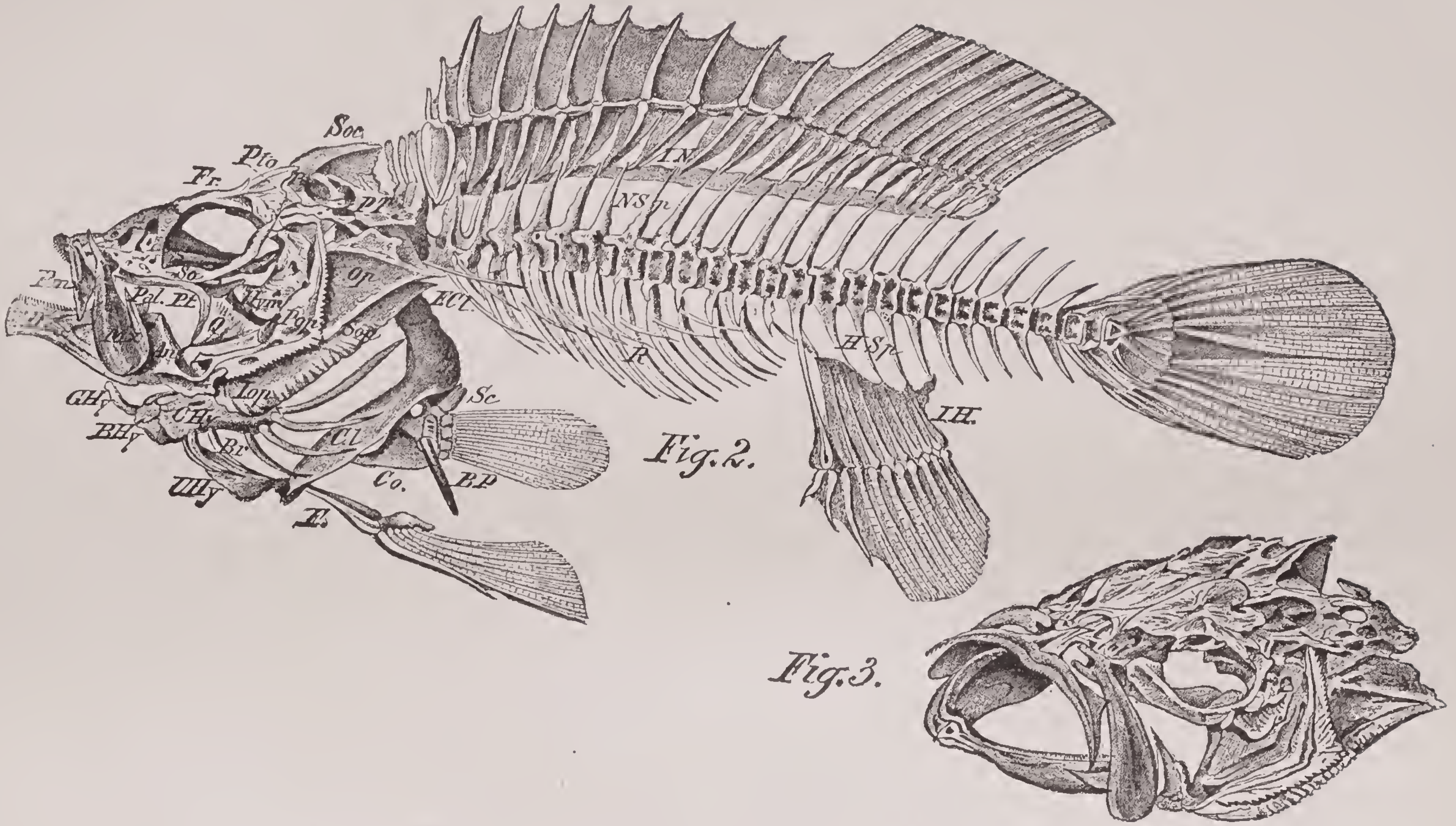


FIG. 1.--*Skeleton and Skull of a Percoid Fish. The Letters are Abbreviations of the Names of the Bones Given.*

NSp, Neural spines; IN, internal bones; HSp, hæmal spines; IH, interhæmal bones; R, ribs; Soc, superoccipital; PT, plerotic; ECl, epiclavicle; Cl, clavicle; Sc, scapula; Ba, Pectoral basilars; Co, coracoid; the bone behind it is post-coracoid; Op, operculum; Sop, sub-operculum; Iop, interoperculum; Pa, parietal; Hym, hyomandibular; Q, quadrate; at the right-hand upper corner is situated the symplectic; CHy, ceratohyal; Br, branchiostegal rays; BHy, basihyal; GHy, glossohyal; UHy, urohyal; Fr, frontal; So, suborbital; An, angular; D, dentary; Pmx, premaxillary; Mx, maxillary; Pal, palatine; Pt, pterygoid; F, femur. Fig. 3. Oblique vertical view of the skull represented in Fig. 2

and fingers are represented in fish by the rays and membranes of fins.) Besides these two pairs of fins, they have dorsal, sub-dorsal, caudal and anal fins—varying with different families and greatly modified. They breathe or oxygenate their blood by taking water into their mouths, passing it through the gills and out at the opening of the gill-cover. The eyes of fishes cannot be closed. Whether they sleep or not is a mooted question. Their eyesight is very acute, making up in sensitiveness for the lack of some of the other senses—except in some of the cave fishes, in many of which the eye is only rudimentary and not observable from the outside.

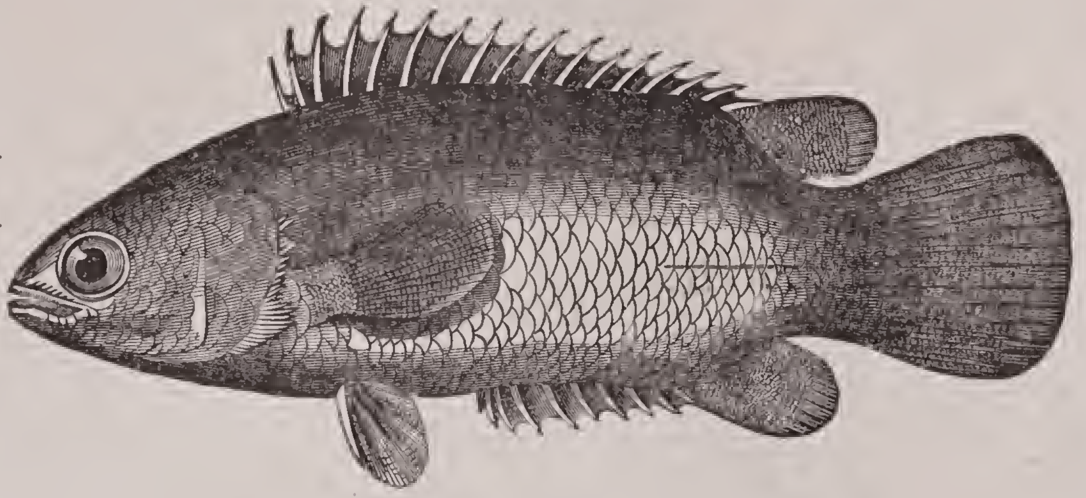


Fig. 2.—*The Climbing Fish, of India.*

The skeletons of fishes vary. Some are very bony, with bones as tough and nearly as hard as horn; while others have, instead of bone, only cartilage. Most fishes have scales and some of the scaly fishes, known as ganoids, have a glutinous substance covering the body, called ganoine. Ctenoid scales have their posterior edges pectinated or saw-shaped, while the cycloids have smooth-edged scales.

The tail or caudal fin is the propelling power, principally—the side, or paired fins being used for balancing. Most fishes can swim very rapidly and some of the migratory fish make long journeys in an incredibly short space of time. Most fishes are furnished with a membranous bag filled with air and called the swimming bladder. This enables them to increase or diminish their specific gravity, and so float or sink as they desire.

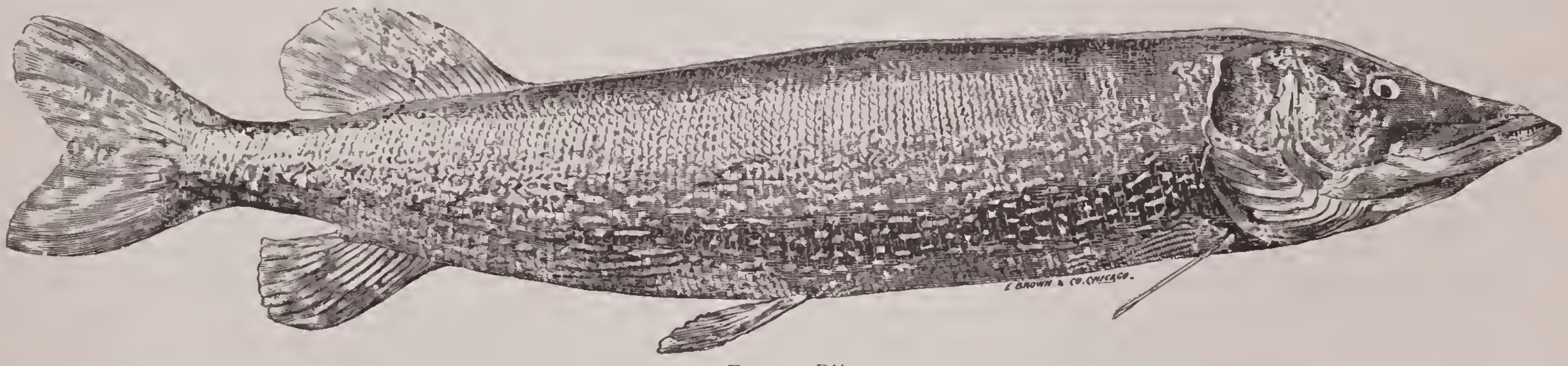


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Fig. 3—*Pike.*

The life of a fish is devoted to procuring food and escaping from its enemies, at which they become expert or careless as dangers are more or less numerous about them. Their growth depends on the quantity of food taken and the amount of exercise required to procure it, and the temperature of the water in which they live. The warmer the water the more rapid their respiration, or in other words, the faster they live the more rapidly they will digest the food they take.

Such fishes as spend a portion of their lives in fresh and part in salt water are called migratory. Those that, like the salmon and shad, make their growth in the sea and migrate up our streams to deposit and mature their eggs, are called anadromous. Those that, like the eel, procure their food and growth in fresh water and return in the fall of the year to the ocean to hibernate and breed, are called catanadromous fishes.

The shape or position of the opening of the fish's mouth tells whether he is a top, bottom, or middle feeder. The sucker, buffalo, sturgeon and others of their class have the mouth opening downward and feed upon the bottom. The bass, croppie and many of the percoids have the mouth opening upward, thus saying to us that they approach their food from below; while the trout, pickerel, and most of the cyprinoids, with their mouth opening directly in front, go straight for their food. Some have no teeth; but generally there are large numbers in different parts of the mouth and throat, which vary widely in form, number and position. The horrid set which the shark carries is regularly shed and replaced by new.

As to whether fishes hear or not is an undecided question. Some ichthyologists do not believe that fishes have an organ so sensitive as to feel the vibration of air caused by talking or any ordinary sound above the water; and that they can be called by the voice or by whistling, they think are mythical assertions. To such concussions as cause the ground or water to vibrate they are extremely sensitive. For instance, thunder, the firing of a cannon, etc., in the air and entirely away from the water, and anything that directly causes a vibration of the water, like the striking of an oar against the side or bottom of the boat ever so lightly, will cause the fish almost instant alarm. Some think that the scales are connected by small nerves with the nerve centers, and that hearing with the fish is sensitiveness to the vibrations of the water only—conveyed to the senses through the medium of the scales. All fishes have scales, even the brook trout, eel, etc., that to the naked eye appear scaleless.

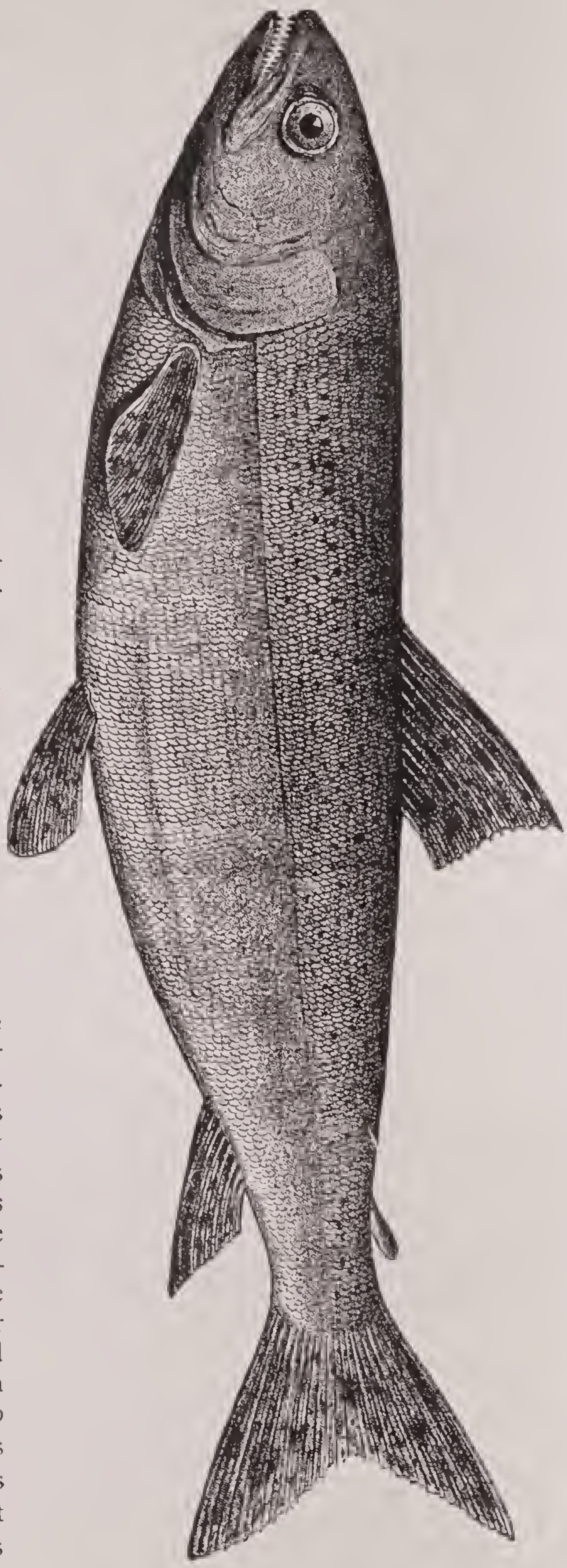


Fig. 4.—*California Trout.*

Most fishes are oviparous in their manner of reproduction; but some species bring forth living young. They produce a far greater number of eggs than any other vertebrates. A salmon sometimes contains as many as 20,000 eggs; a perch, 28,320; a herring, 36,960; a mackerel, 546,000; a flounder, 1,357,400; a sturgeon, 7,635,200; a cod, 9,344,000; and a species of Upeneus, 13,000,000.

Fresh-water fish of many species are everywhere regarded as delicious food, and sought after with avidity, and in many districts they constantly form an article of luxury to some classes and of commercial profit to others. Fish from the seas as well as fresh, and in great variety, enter largely into human diet. Catching fish, for pleasure and profit, is one of the absorbing employments of men, and has been from the remotest time of which we have any knowledge till the present. Until quite recently the native wildness of fishes was supreme and undisputed; but now the art of man has contrived a system by which fish can be domesticated and cultivated for profit. It is true that the subject of securing from the waters a larger supply of fish than they would spontaneously afford, has attracted the attention of various nations from a very remote period, one of the first and simplest methods consisting in the collection of fish into natural or artificial ponds or reservoirs and allowing them to prey upon each other, or by supplying food to them artificially. This plan was in vogue among the Romans especially, and it is asserted that not infrequently the food thus supplied consisted of the flesh of slaves, which, it was claimed, imparted to the fish a rich and delicate flavor. The claim has been raised in behalf of China as having earliest practiced pisciculture. But if by this is meant the artificial fecundation of the eggs of fishes and raising them in limited spaces, the assertion can hardly be sustained. It is true, however, that very great ingenuity has been expended in China in securing the fertilized eggs of fishes after they have been already deposited, in rearing the young fish, and in stocking the waters with the best adapted varieties. In this respect they may be said to have practiced the art of aqua-culture from a period far antedating the prosecution of the same art by any other nation. As far as the eggs of fishes were concerned, their efforts were confined to finding the localities where they had already been deposited, and taking them from the water by means of fine nets, or by having the eggs deposited on fine mats or gratings, and then hatching them on the spot, or carrying them to other desirable places, sometimes to great distances. The histories of many of our older countries give us information in regard to the culture of fishes by similar methods for long ages past. The introduction of the carp into Germany dates back to the twelfth century, and their cultivation in the German states has developed into a permanent industry; but these old methods can be called fish culture only in a very restricted sense. But not until recently in this country has anything been done toward fish culture worthy of mentioning; now, however, the term "fish farming" has become quite common.

Fish Culture. There are few subjects of more importance to the material welfare of our country, or that a persistent and willful disregard of the laws of nature has rendered more necessary, than the culture of the various tribes of fish that were once so abundant in our rivers and lakes, and along our coasts. One peculiarity of the American people is, that they attack, overturn, annihilate, and then laboriously reconstruct. The pioneer farmers chopped down the forests and shade trees and took crop after crop of the same kind from the land, exhausting the soil and making bare the country; they hunted and fished, destroying first the wild animals, then the birds, and finally the fish, until in many places scarcely a specimen was to be found. Then, when they had finished their work of destruction, the restorer came and began to manure the land, left it fallow, put in practice the rotation of crops, planted shade and fruit trees, discovered that birds were useful in destroying insects and worms and passed laws to protect them, and now they are turning their attention to re-stocking streams, rivers and ponds with fish. Experiments in fish culture, except that above referred to, were begun in the salmon streams of Scotland in 1833, and in 1837 a few fish were artificially hatched and reared to the age of two years. But we are indebted to two Frenchmen, Remy and Gehen, for what we know of practical fish culture. Being fishers for a livelihood, they saw and deplored the steady diminution of fish in the streams they frequented, and, seeing how myriads of eggs were spawned and came to nothing, about 1832 they studied out a means for preserving them and making them fruitful. Their efforts were rewarded with success, and out of their work has sprung the rising industry of fish farming.

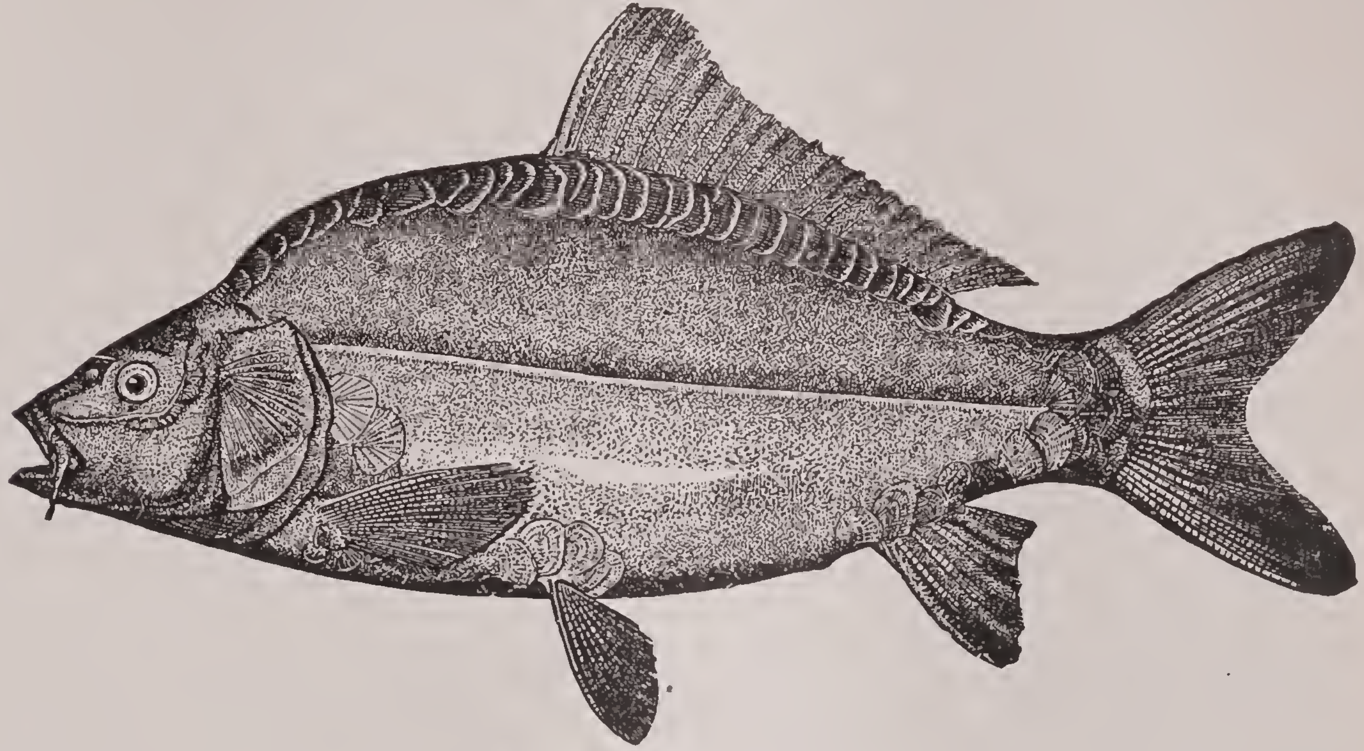


Fig. 5.—*Carp.*

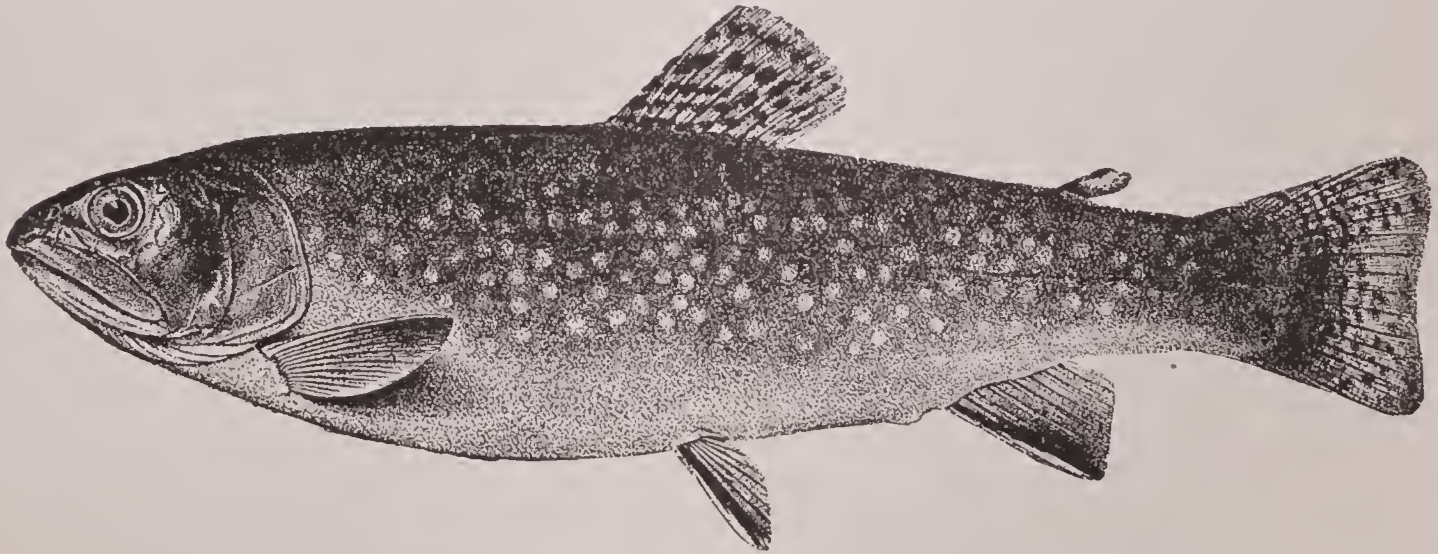


Fig. 6.—*Brook Trout.*

The methods of fish culture are the same in all properly conducted establishments in Europe and the United States. In the spawning season the female ascends the stream, digs down into the gravel and deposits her eggs. The male goes over the eggs to "milt," or impregnate, them, and the milt and spawn are deposited at the same time. The female then returns and covers the eggs with gravel, and they are left to become the prey of other fish, fowls, or reptiles, or, perchance, to hatch. The fish farmer simply secures the eggs, sees that they are impregnated, watches their hatching, protects the fish from their natural enemies and unnatural parents, feeds them and brings them to maturity. There is nothing elaborate or intricate in it. The more important part of the business is to provide impregnated eggs and young fish for transportation, to re-stock rivers, to supply the numerous private ponds, and to raise sufficient fish for further breeding.

The essentials for a fish farm are clear spring water ponds for fish of different ages, and a hatching house.

The necessary implements are a bucket, tin pans, a ladle, a small net, a syringe for feeding, nippers and a siphon to remove dead ones. A stove to warm the house, troughs, divided into boxes, for conveniently distributing the eggs, and the young fish, when hatched, complete the establishment.

When the breeding fish are "ripe," that is, ready to spawn, the farmer fills a tin pan with pure spring water, over which he holds the male fish in his left hand, keeping the fish's belly under water, while with his right hand he compresses the fish, and with his fore-finger gently presses out the milt. The female is then taken in hand and her eggs pressed out in the same way. This process, even under the most skillful handling, and the speediest return of the fish to the water, is quite exhausting and is fatal to about three per cent. of the parent trout. Experiments have accordingly been made to arrange wire screens in the ponds, on which the trout may naturally spawn, when the ova thus impregnated may be removed to the house. This has been done with success in New York and elsewhere.

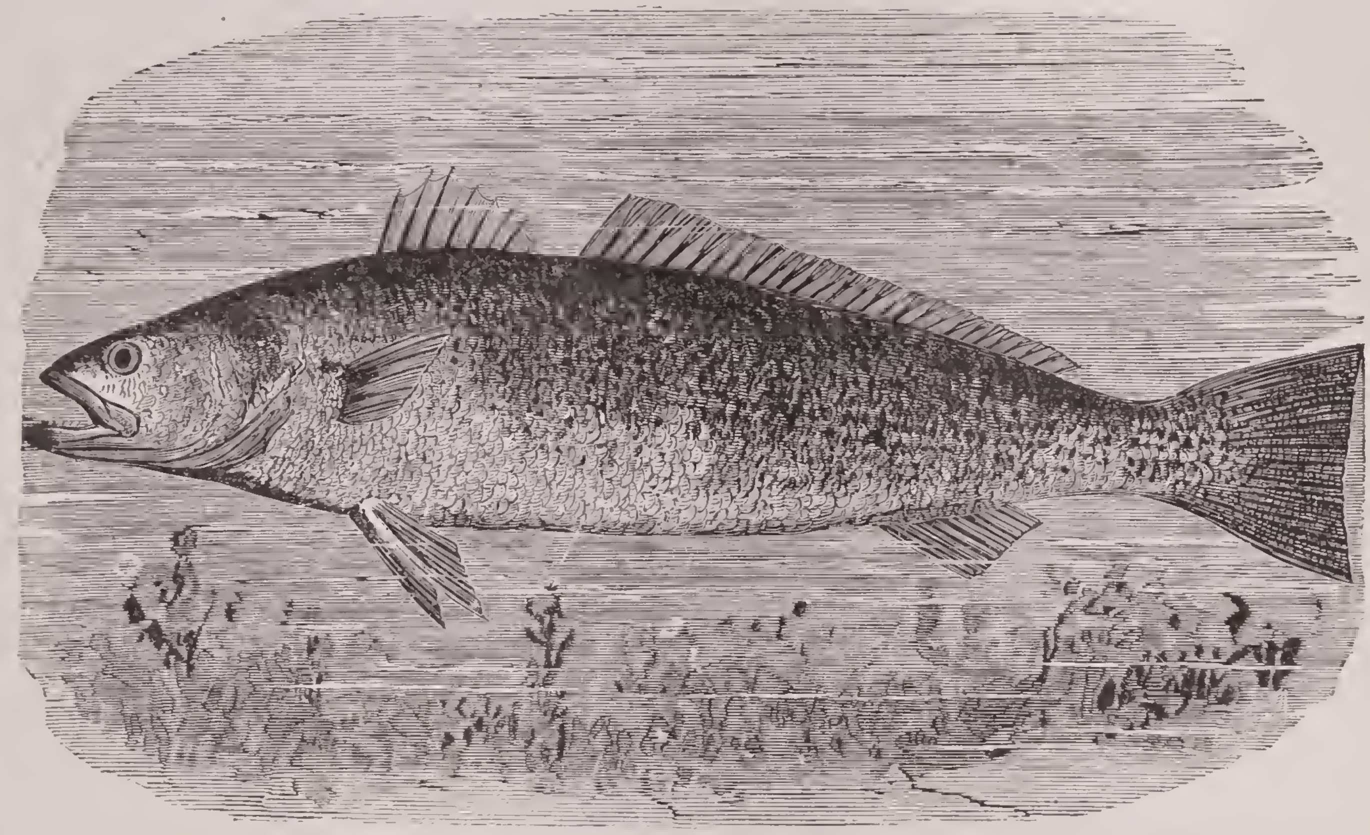


Fig. 7.—*Weak Fish.*

The above directions are according to Seth Green, the pioneer fish culturist of this country. Others instruct to use as a receiver of the extruded spawn and milt a perfectly dry porcelain, or other non-corroding dish, and immerse the hands in water to prevent the glutinous covering of the fish adhering to the hands, which injures the fish. By this procedure the milt of the male is dropped directly from the body of the fish upon the ova of the female. As soon as the milt is dropped pour water on to cover the eggs, and stir with a quill, glass rod, or tail of a fish. It is thought that greater success is secured by dropping the eggs dry.

The eggs, after 40 minutes' contact with the milt, are transferred from the pan to the hatching boxes, and evenly spread over the clean bed. Over this bed flows a stream of filtered water. The boxes should be watched in regard to cleanliness and temperature of the water, and for the immediate removal of any dead ova (eggs). The death of the eggs may be known by change of color. According to temperature, in from 40 to 125 days, the eggs will hatch. For 45 days the young fish is fed by the yolk-sack attached to it, which is gradually absorbed. The young fish is now an inch and a half in length, and must be fed with beef liver and sweet cream (all cream is better), finely chopped and sifted, mixed with water, and supplied to the boxes through a small syringe, taking care to furnish enough, but not too much, as the food not eaten will foul the boxes and kill the fish. In six months the fish is three inches long, and must be fed with sifted curd. In a year it is six inches long, and is removed to a pond, where he and his fellows will be safe from larger fish, to make room for fresh ova in the hatching boxes.

The fish may now be fed with finely cut liver, with curds, grasshoppers, and with small, chopped fish, on which they will thrive. At the end of the second year they will be ten or fifteen inches in length.

The spawning season for shad is from February to June. The spawn of these fishes is put in hatching boxes, and immersed in the river to be stocked, and with water at 75° the eggs will hatch in eighty hours. The young fish subsist for three days on the yolk-sac. The female shad at two years old will weigh two pounds; at three years, three and a half pounds; at four, six pounds. The wonderful fecundity of shad, the ease with which they can be bred, and the fact that they need no subsequent feeding or care, make them peculiarly profitable for pisciculture.

Trout, according to age, will yield from 200 to 4,000 eggs. The annual yield of salmon is estimated at 10,000; shad, according to size, yield from 50,000 to 100,000 eggs. The work of the fish culturist is to preserve this spawn, to make it productive, and so to supply unlimited quantities of the best kinds of fish for market.

Filters for the hatching house are provided by means of one or more flannel screens laid under the spigot which supplies the trough.

In selecting a site for a fish pond be sure that the supply of water is unfailing. It would be convenient, though not absolutely necessary, to have such a fall that every pond could be drained, and the pond should be so situated that overflow from freshets is impossible. For this reason it is better to make ponds at one side of the stream instead of damming it. Ponds for fattening purposes are made 12 x 24 feet, either square or oval. In preparing ponds it is better to enclose the water with stone or wood, because embankments are liable to be punctured by muskrats, which liberates the water. If stone is used cement the sides and grout the bottom. There should be 30 or 40 inches of water in the pond constantly.

Adult fish should be fed regularly once a day, and they should be fed till they will eat no more. It is good economy to cut the feed finely and feed slowly.

The preceding directions pertain mostly to the propagation and culture of trout. White-fish, salmon trout, and other fish can be similarly propagated, but require deeper water for growth, according to their various habits.

In rearing fish the greatest difficulty is in protecting the eggs. B. F. Shaw, Fish Commissioner of Iowa, in some very practical observations on fish culture before the Farmers' Institute of that State, says: "It is well known that there is no more attractive food for fishes than the roe or eggs of fish; even the parent fishes devour them greedily. It is generally granted that at least 60 per cent. of all the eggs are devoured before the fish are hatched, while of the 40 per cent. hatched probably at least three-fourths are eaten while in a helpless condition with the yolk-sac attachment, and before they are able to feed themselves, or take any measures for their own safety—in fact, with just enough vitality and motion to attract their enemies.

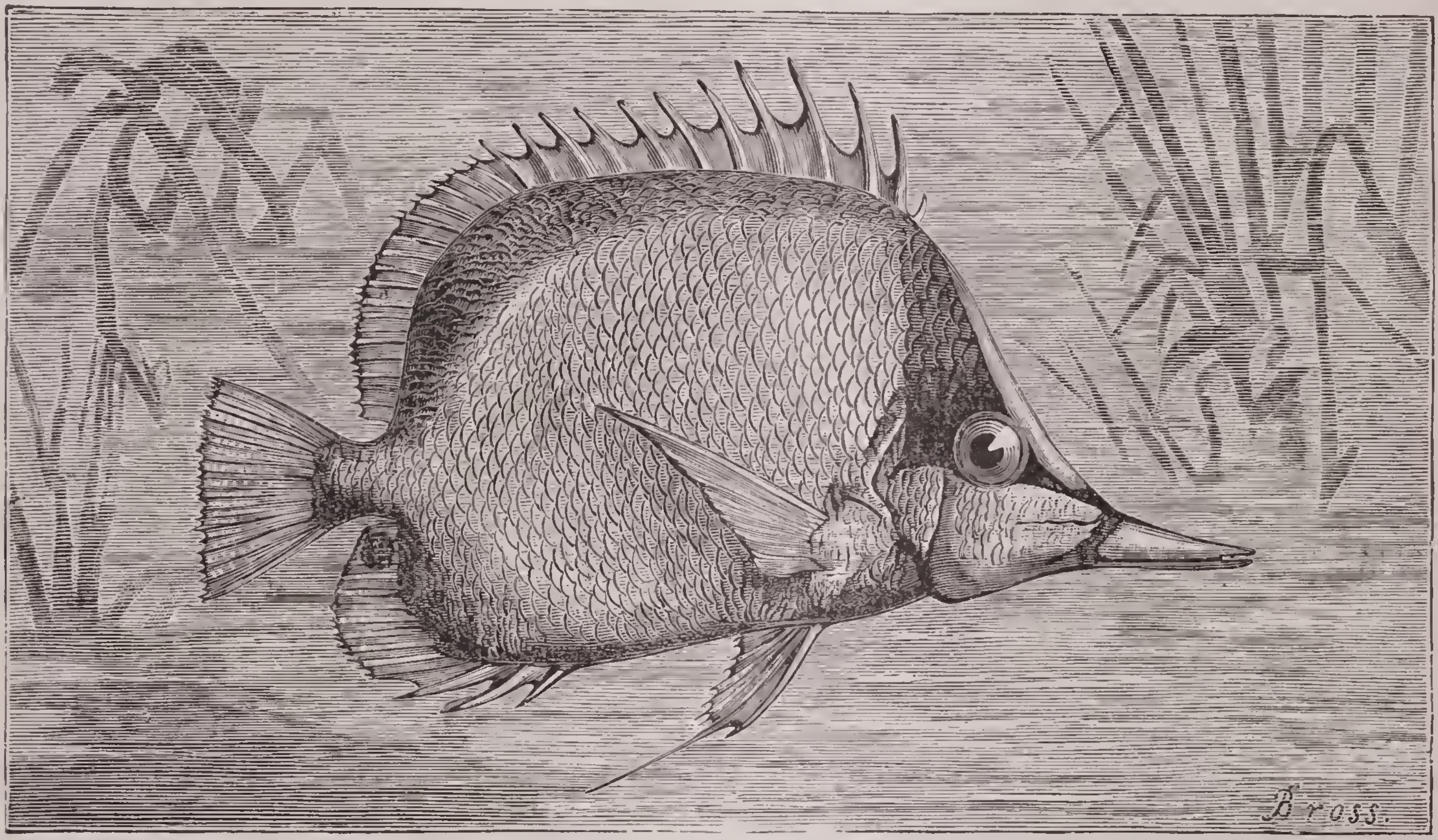


FIG. 8.—*Long Nosed Chelmon.*

"Again, a serious loss is occasioned under natural conditions by the failure to vitalize the eggs. Probably less than 20 per cent. are ever vitalized. These estimates reduce the numbers of fish produced from a given number of eggs to two per cent. that live to a point in their lives where they are able to take their own food under natural conditions; while by artificial methods 95 per cent. is not an unusual result, and 40 per cent. loss would be considered very bad work indeed. From this point on, the fish would be subject to the same dangers in both cases.

"Fish culture is but just in its infancy, and, while much has been already accomplished, very much more remains to be done. We have yet more fully to study the character of every lake, pond, river, reservoir or other waters, in regard to its character and capacity to produce fish. What is its temperature, what does it now produce in the way of fish, and what would be better suited to it? What are its present productions—vegetables, infusorial or insect life—that will furnish food for fishes, and what of these that, if introduced, would find a suitable home? To illustrate, let us examine one of our smaller lakes. We find a few bass and wall-eyed pike, but we find them in small numbers, of small size, lank, lean, and with a ravenous look. These facts give us evidence that, while the water is suited to produce these valuable fish, the food on which they live and thrive is wanting in their haunts. They are carnivorous. They live almost wholly upon minnows, and these we will find almost if not entirely wanting. In our explorations we find a bed of water plants. We pull one up, and find it covered from end to end with small insect life—too small to be of any use to the carnivorous fishes, but precisely what would delight the stomach of a smelt, and make him a fish paradise. We introduce the smelt. He lives, thrives and grows, and in a short time the water will be swarming with young smelts. We dip up a paddle full of mud from the bottom of the lake, and we find it filled with small red worms, and other forms of infusorial life. We know that this is the food of the buffalo, red horse and sucker. We at once introduce a few large buffaloes. He finds these rich banks of mud and infusoria much sooner than we could, and turning his tail to the surface of the water, he soon fills himself with the portions of the bank richest in that nourishment on which he lives and thrives. Soon we shall have added to the lake millions of young and many large buffaloes. Again, we find varieties of tender water vegetation. We know that upon these the carp and other vegetable-feeding fish live and thrive. We at once introduce the carp. He finds a happy home. He grows and rears his millions of young carp fry—estimated as high as 300,000 for a five-pound fish.

"So we can go on to almost indefinite length and utilize the various conditions we may find, but we are now turning the insects into smelts and minnows, the infusoria into buffalo, red horse and suckers, and the water vegetation into carp and other valuable varieties of vegetable-feeding fish. But I think I hear some one say, 'I do not like suckers or red-horse; they are poor food, and the buffalo is but little if any better, and the carp and smelt are too much in the future, and so are only speculative.' Very well, my friend. I shall tell you that these fish are much better than the insects, infusoria mud, or water vegetation for human food; but these are not the results we were aiming at; they are still to follow. Some day one of the lank, lean bass which has been living upon his own young until there are no more to live upon, pressed by a voracious appetite, determines to change his diet. He catches a young smelt. In place of the hard, scaly armor of the young bass he finds the soft body of the smelt; instead of the stiff, sharp-pointed spine rays of bass fins that so often have very nearly taken his life as he has gorged his old food, he finds only the soft, velvet fins of the new. He needs no further argument to cause him to henceforth forswear the bass and take to the new food. He took the old, obnoxious, unnatural food sparingly, for the labor and pain of taking it made him do so. This caused his for-

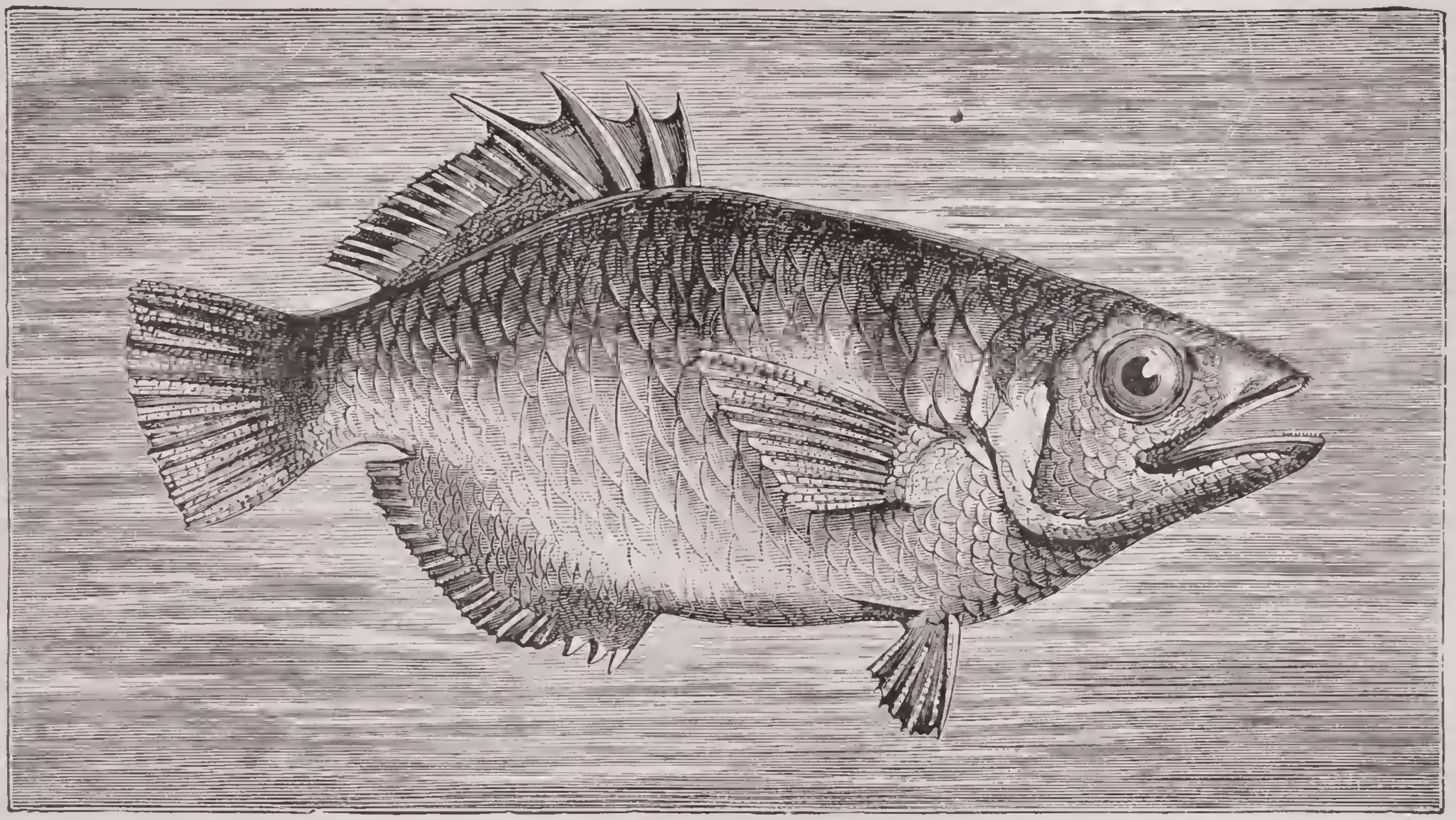


FIG. 9.—*The Archer Fish.*

mer small, lank, and lean condition; and because he took the young bass for food, you have a reason for their former scarcity. The eating of the new soft-rayed, finned fishes is a luxury, and their plentifulness insures him a full meal with but little labor, and with these conditions he will soon grow in size and fatness, while the immunity given to the young bass will soon cause the water to teem with them. So we can evolve our bass, wall-eyed pike, salmon, brook-trout and other valuable fish from the insect, the infusoria, the vegetation and other sources of food by simply furnishing missing links. Is there anything further we may do upon the ground, or rather water, we have just gone over? Let us see. Suppose when we pulled the weed we found no insect life, but we knew that in an adjoining water the same weed were alive with insects. How easy to carry a stem of the weed with its insects from the one to the other; and where is the housewife that has seen the one solitary fly of spring-time grow into millions before the frost of winter, that could not foretell what the transplanting would soon accomplish; or, again, if when we dip our paddle of mud, we find, instead of a soil full of infusoria, a rich but barren muck or marl, in which the insect-bearing weed thrives, how easy to transplant an insect-covered weed and thus furnish a source of supply for both weeds and insects; or if, instead of the proper soil, we found only sand or gravel, we could still introduce the proper soil itself. Thus, if we found only barren water, with a sand or gravel bottom, we could introduce the proper soil, the weed, the insect, the smelt and the bass, successively."

The above are not barren theories but are facts that may abound in practical results to the farmer. He may make the barren water abound with princely fish, by a little care and labor, which when once entered upon will afford him a vast deal of pleasure and satisfaction in prosecuting. The cultivation of fish in private ponds is carried on only to a limited extent, but the success met with where properly conducted and the comparative profits realized upon labor and food used in raising fish, and the future demands of our rapidly increasing population will conduce to turn the attention of our people more in the future than in the past to a subject so big with the health, wealth and prosperity of coming generations. The famous brook trout, the lake or salmon trout, the California or McCloud River trout, the mountain trout, and grayling for ponds fed by springs, and the scale, leather or mirror carp for other ponds, are a few of the better fish for domestication. The results reached already in their cultivation have been a surprise to those who have cultivated them and studied their habits.

VARIETIES OF FISH.

The subject of preserving and propagating fish leads to the consideration of varieties. We give a list of many of the more common fresh-water fish arranged alphabetically, with short observations on each. The list is far from complete, but comprises most of those worthy of mention. We give only the common names by which they are known, and where the same fish is known by different names in different sections we give the several names.

BASS. We mention the two most important species.

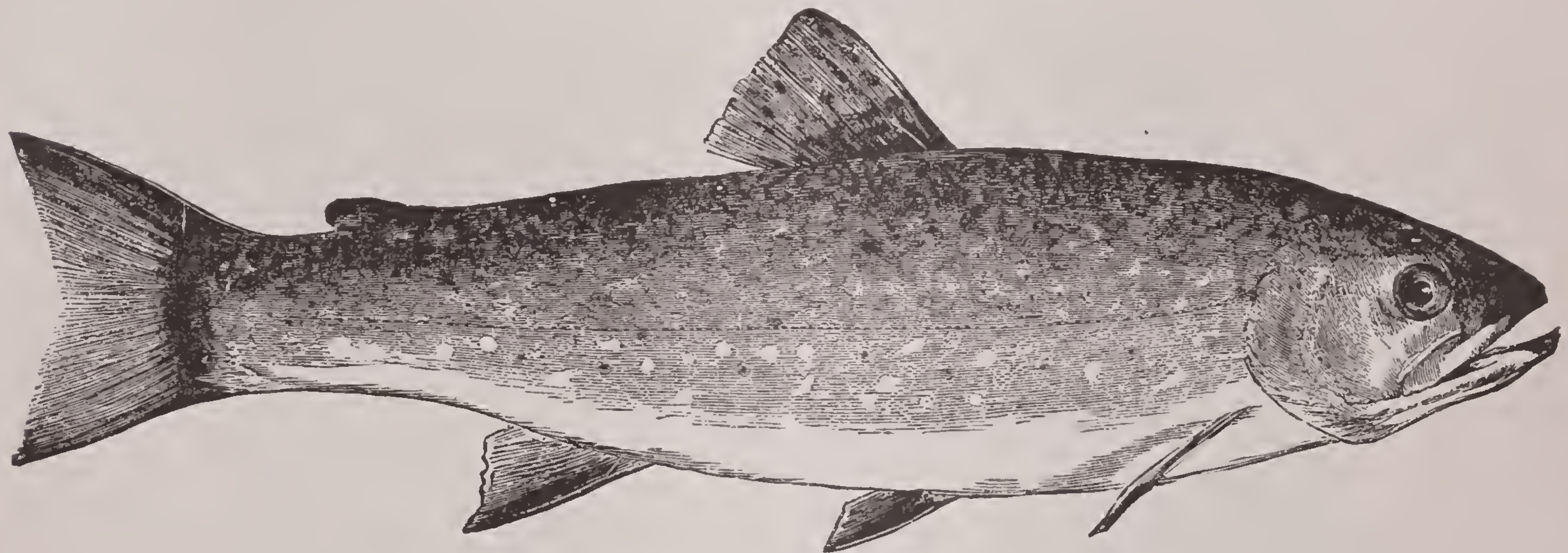


FIG. 10.— *Trout.*

Black Bass. This is eminently the game-fish *par excellence* of western waters. It is not so particular in its habitat as trout. If the waters are very clear, any brown or black fly will answer in baiting them. For trolling the necessary tackle consists of a strong hand-line of linen or cotton from 25 to 75 yards long, a medium-sized swivel, and a spoon hook, and the usual accompaniment of red and white feathers and a group of hooks. The ordinary tin or brass spoon with a single hook, soldered on with a swivel, will be found equal if not superior to the late inventions. Still fishing is generally done from an anchored boat. This is a very popular method, and the one generally practiced in the Northwest. The finer and more delicate the tackle employed, the greater will be the sport; but, as a rule, still fishers use clumsy tackle. When the bass takes the bait, let him have it for a a short time, say from five to ten seconds, according to his mood, whether he is on or off his feed, whether eager or shy; and by using the thumb as a drag, give him line as he needs it, but not too freely, always keeping it taut enough to give a slight bend to the rod, so as to be able to feel every motion of the fish. At the proper time the angler must check him by pressing the thumb a little harder upon the reel, and if he gives a succession of short tugs or slight jerks, let him go for a few moments; but if he seems to feel the steel, or if he pulls steadily and strongly, hook him by a "slight twist of the wrist," not by jerking or "yanking" the rod, for in the latter case there is a stronger probability of breaking the rod, or at least of tearing out the hook, than of hooking the fish. When the bass is hooked, the angler must never, under any circumstances, give him slack line. If he breaks water, merely let the rod straighten as he falls back; and never, under any circumstances, must he grasp his rod above the reel, at most not more than several inches above, for by so doing he destroys the spring and balance of the rod, and it is liable to become broken by any sudden movement of the fish. The bass must be killed "on the rod," then reeled in and taken into the landing net.

In trolling or casting with the minnow, when a fish is hooked let the oarsman pull out at once to deep water, so as to give the fish better play and more room, and also to prevent his taking to the weeds.

The angler should never be in too great a hurry to land his fish, for if he is well hooked he cannot get away; but if he is hooked in a thin or weak part of the mouth, there is a greater necessity that he should be gingerly played and tenderly handled, until he is completely "tuckered out" and turns up his belly to the sun. There is never anything gained by too great a hurry in bass fishing. On the contrary, "the more haste the less speed," is a maxim particularly applicable to this case.

In landing a bass the oarsman should, at the proper time, hold the net just under the surface of the water, and hold it perfectly still while the angler brings the fish into or immediately over the net, when the oarsman should lift it quickly and with one motion. He should never be suffered to follow the fish with the net, or by sudden lunges attempt to secure him; for this only serves to frighten the fish and put your tackle in jeopardy. Remember that the largest bass always escapes when nearest the boat, about to be landed.

Straw, *Rock*, or *Calico Bass; Goggle-eye;* or *Croppie*. This fish is a good pan-fish, and a free biter, but destitute of game. Spawn on gravelly bottoms, in April; are taken in great numbers with minnow bait early in the season; weight from one to two and a half pounds.

BUFFALO. This is one of the largest of the suckers found in western waters. Is generally caught with the spear or "gig," and with the seine. Can be caught with a hook, by a bait of corn-meal dough and cotton. As soon as he begins to nibble or suck, throw the pole suddenly to his rear, so as to make the hook catch a thin hold of the lip; give him line until he is worried down, then draw him near and harpoon him, or secure him with a gaff-hook. His flesh has rather a muddy flavor, but it is popular among the western people.

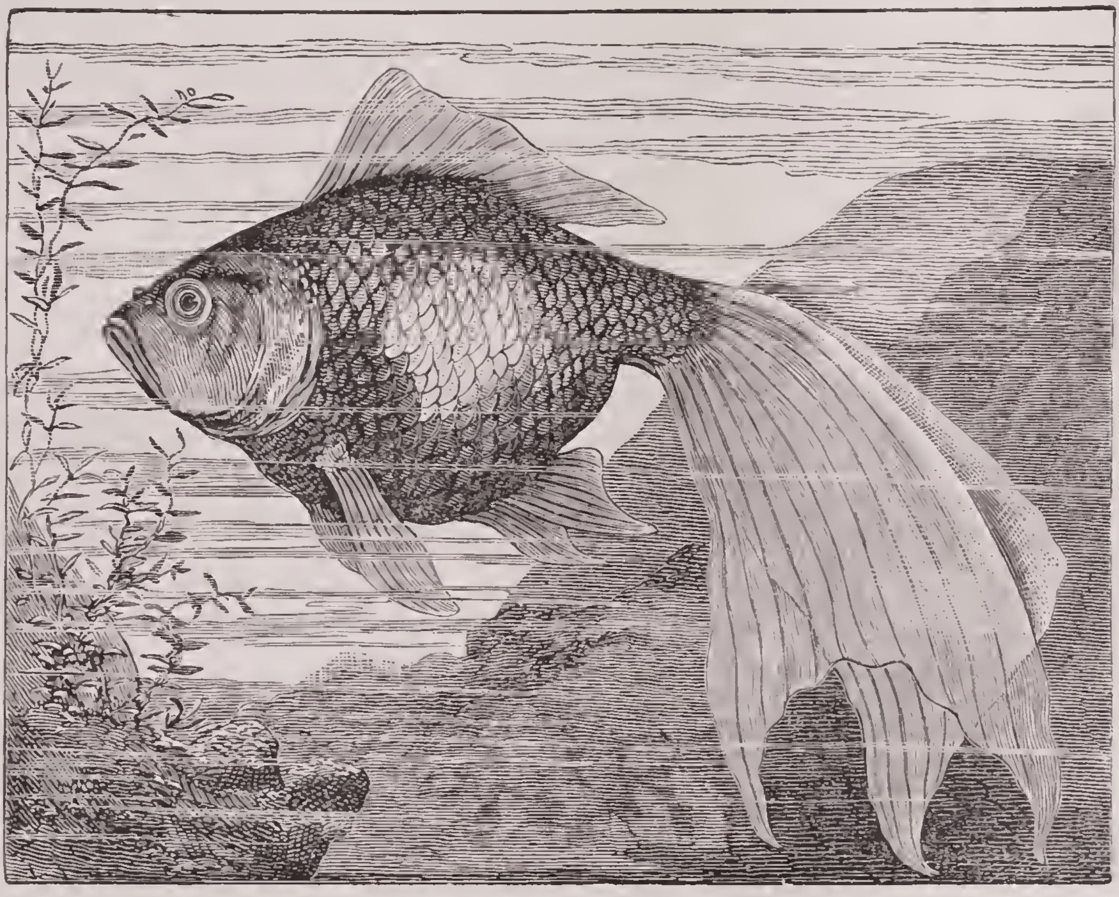


FIG. 11.—*The Kingo Fish.*

CARP. This fish is now attracting the attention of practical pisciculturists in this country. It was first introduced into this country from France in the year 1832. They were first placed in a pond near Newburgh, on the Hudson, and afterward introduced into the Hudson, where they multiplied very rapidly, and have since been introduced into the Southern States, over which they have spread quite generally. There are three kinds which are profitable,—the common scale carp, with scales regularly and normally distributed over the body; the mirror carp, with scales limited to the regions of the bases of the fins and the hinder parts of the lateral line and thus enlarged; the leather carp, with scales entirely or almost entirely lost, leaving the soft, naked skin. The growth differs according as the fish inhabits cold or warm water, a river, lake, or pond, finding plenty of food therein, or being fed. An additional factor is the quality of the soil, whether muddy or stony. In cold water or such as has a stony ground, it will not flourish so well. In the culture of trout they must be fed, while the carp, if it be cultivated judiciously in ponds, needs no feeding. The normal weight which a carp may attain in three years, whether it be scale, mirror or leather carp, is an average of three to three and one-quarter pounds; that is, a fish that has lived two summers will weigh two and three-quarters to three and one-half pounds the year following. They live to a very advanced age. Specimens are found in Austria over 140 years old. It increases in length only up to a certain age, but in circumference till its 35th year. As for food supply, carp will eat almost anything, either vegetable or animal, though the former is the preferable. It has been said that they will eat anything that a hog will. Wild rice is an excellent food for them, and where pond lilies or other aquatic plants do not already exist, the sowing of wild rice will furnish them all the food they need. Many farmers can make more on an acre of water in raising carp than they can on an acre of land, and the Government stands prepared to furnish them, without cost, the necessary material for planting.

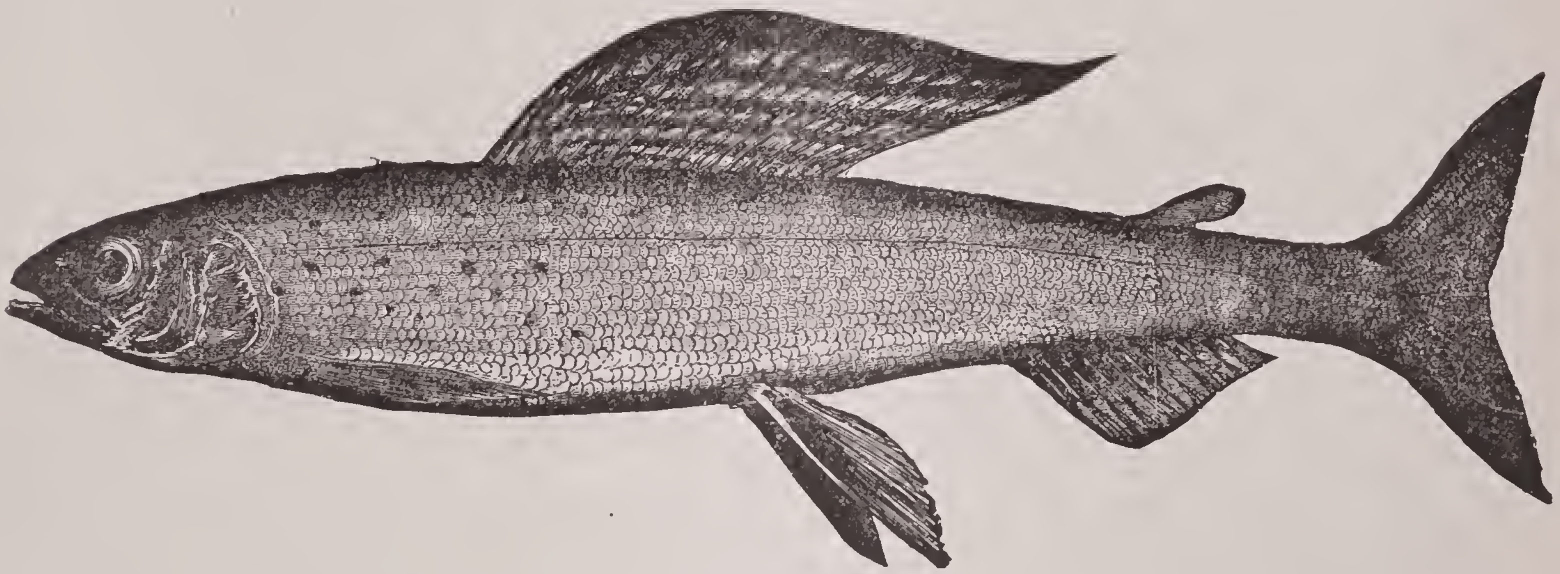


FIG. 12.—*Grayling.*

The **CATFISH**, or Cat Family, comprises a dozen or more varieties, most of which are not worth mentioning in their relations to the angler.

The *Great Lake Catfish* grows to a great weight, often reaching 80 pounds. Its general color is olive brown. It is not generally esteemed as food, although it is much eaten, and by some persons well recommended. Like most of its congeners, it prefers the mud.

The *Common Cat*, the *Bullhead*, *Horn Pout*, *Bull Pout*, or *Minister*, has a wide range, and too great a notoriety for his worth. Its color is dusky. Is caught from first of April throughout the summer, with almost any kind of meat or worm bait, in ponds or lakes where the bottom is muddy. Many people eat them and like them.

The *Channel Catfish* is the best of his tribe, and is generally found in clear, pure streams in the Middle and Southern States. He is of a clean greyish blue color, and makes some sport on the hook. A good table fish.

There are but two species of catfish found in the West—the Mud Cat and the Lake or Channel Cat. The former is worthless, but the latter, which is common in the waters of the Upper Mississippi, is universally regarded as a fine and healthy food fish, and is much sought for by many. It is of a dark brown color, sometimes nearly black; attains a large size, occasionally weighing as much as 100 pounds, taken with hook and line, with any kind of bait from a piece of wheat dough to any piece of meat. Beef's liver is a favorite bait. On the hook they are strong and most obstinate, and will often carry away the strongest tackle.

Night fishing with a lantern or torch is the most successful for all kinds of catfish.

GRAYLING, MICHIGAN GRAYLING. There is no species sought for by anglers that surpasses the grayling in beauty. They are more elegantly formed than the trout, and their great dorsal fin is a superb mark of beauty. When the well-lids were lifted, and the sunrays admitted, lighting up the delicate olive-brown tints of the back and sides, the bluish white of the abdomen, and the mingling of tints of rose, pale blue and purplish pink on the fins, is displayed a combination of living colors that is equalled by no fish outside of the tropics.

In shape the fish is like a trout,—a trifle slimmer, perhaps, and not so thick near the tail; but the fin on the back of a trout looks so small and square, so deficient in outline and color, after beholding the graceful curve of a grayling's dorsal. The scale is large, silvery, with sometimes a copper tinge; near the shoulders there are black spots, sometimes triangular, and at others V-shaped; in some fish these extend nearly to the tail near the back; they are in lines which gradually shorten towards the belly; the mouth is small (nearly square when opened), and the teeth are merely a slight roughness on the lips: none on the tongue.

This tribe of fish bears marked relationship in many respects to the salmon. It inhabits the cold streams of many portions of the United States, Canada, Europe and Asia. It is a game fish of the first quality, takes the fly with avidity, and carries on a brave and spirited contest with its captor. Its flesh is white, or faintly straw color, and excellent in flavor.

Its habitat is the center of the lower peninsula of Michigan, among three rivers of note, where it most abounds,—the Muskegon, the Manistee, emptying into Lake Michigan, and the Au Sable, emptying into Lake Huron. Among the minor streams are the Cheboygan, Thunder Bay, and Rifle, tributary to Lake Huron and the Jordan, emptying through Pine Lake into the Traverse Bay of Lake Michigan.

The grayling is a spring spawner—spawns in April, and is in best condition and fighting trim in September. They take the artificial fly as greedily as trout do, are angled for in precisely the same spots where trout would be sought. He certainly affords as much sport as the trout, and his tender mouth requires more careful handling.

GOLDFISH; GOLDEN CARP. A well known species much fancied for globes and aquaria, often growing to the length of a foot. Body generally brilliant red or orange above and silvery beneath, although they are found grey, silvery, golden, mottled with black, olive, or almost black even. Their colors vary as much as those of litters of cats or dogs.

LAKE HERRING. These fish are very numerous in the shoaler waters of Lake Erie and the western lakes, and very much resemble the salt-water herring in size, form and color. They seldom attain a weight of two pounds. They are not especially sought by the angler. Insects are the best bait, however. They are found in more or less abundance at all seasons of the year, though they swarm in greatest numbers about the middle of November, which is their spawning season. They are not a favorite fish in the market, being rather deficient in qualities as a fresh or salted fish; but when slightly pickled in brine, and exposed to the smoke of a hot fire for a short time, make most delicious food.

HOGFISH; SPECKLED RED-MOUTH; SAILOR'S CHOICE. One of the best Southern food fishes, and is angled for from boats by still baiting with shedder or soft-shell crab. It is excellent when boiled or stuffed and baked. It should be skinned with a sharp knife, as its scales are very tenacious. Body above pale brown, belly silvery; sides marked with numerous orange-colored spots—those above the lateral line in oblique rows, those below it in horizontal rows; fins yellowish, marked in the same way; sides of the head pale blue, with yellow spots. This fish appears in April, and continues until November. It is very common in Bermuda and is caught as far north as Chesapeake Bay.

MASCALONGE. Common in the lakes, and in the larger tributaries of the Mississippi. In seasons of low water, mascalonge fishing is as good in this region as in the Northeastern States. The fish are usually of large size, from 10 to 40 pounds in weight. The manner of taking them does not differ materially from that practiced in other waters, except, perhaps in the fact that trolling from a boat is not generally successful. For excitement no angling can compare with taking mascalonge on rod and line from the shore, or by wading out on the bars. To kill in this manner a 30-pounder and tow him 10 or 30 rods to shore requires nerve and strength, great skill, and very strong tackle. Many of the very largest are frequently lost by weak tackle and unskillful playing.

PERCH. There are several good varieties of fish under this general name.

Yellow Ring Perch. Sides yellow; six to eight dark vertical bands over the back; fins orange.

The yellow perch is one of the most widely distributed of our fluviatile fishes. They are sometimes caught weighing three or four pounds, and even more. Take bait freely, and are often taken with a fly, preferring the red ibis. They swim deep, and are usually found in company with the sunfish, and frequently with the black bass.

Black Perch is a deep brownish black fish, with a yellowish tinge, found in various deep fresh-water ponds on Long Island, New York, and takes the fly readily, affording much amusement to the angler. Weighs one or two pounds, and is esteemed as food. It has the general form of the yellow perch.

Pike Perch; Wall-eyed Pike; Ohio Salmon; White Salmon; Glass-eyed Pike; Western Salmon. This splendid fish is found in great abundance in all the tributaries of the Ohio River, in Lakes Pepin and Huron, in Kentucky and Tennessee, and indeed throughout the western waters generally, as far west as the Mississippi. Tons of them are taken through the ice in Lake Pepin in March, just when they are making their spawning beds. Color, yellowish olive above the lateral line, lighter on the sides; silvery beneath; head and gill covers mottled with green; dorsal fin light yellowish, spotted with brown; pectoral fins yellowish olive. It is a true perch, although its form and habits suggest very naturally the idea of a pike. Its scales are hard, close and difficult to detach. The mandibles are wider, and the jaws stronger than those of the pike, while its teeth are shorter and closer set. It is exceedingly voracious, and is highly prized as food. It is caught readily with the hook, baited with minnow or crayfish. The best time for fishing is in the dusk of the evening. The foot of rapids, or beneath milldams appear to be its favorite haunts. In the heat of summer it seeks the deepest part of lakes or the coolest part of streams, concealed under weeds or grass. Use regular brass rod and reel, and fish with a float. Anchor your boat at the side or above a rapid, and let your bait run down the rapid, for they sometimes lie behind huge rocks in the rapid. They average perhaps six or seven pounds, but are often much larger.

Goggle-eyed Perch: Strawberry Perch; Chub (South Carolina); *Croppie* (St. Louis); *Grass Bass* (Ohio); *Chinkapin Perch* (Louisiana); *Sac-a-lai* (New Orleans Creoles). This fish of many names and extended habitat has a dusky bluish-green back; sides and belly silvery, and marked with irregular, oblong greenish-black blotches that resemble "chinkapins." Fins yellowish; length 12 inches, and weighs up to three pounds. Inhabits ponds and streams of running water, though it prefers the former. It ranges from Lakes Huron and Erie to the Southwestern States. It feeds on insects, and takes bait freely, and also minnow, going at it with a rush. It is a pretty fish, and much esteemed.

PICKEREL. Body above olive brown, often with a greenish tint; belly silvery; sides pale silver gray with dusky bars more or less oblique; fins red. In some waters its general color is quite dark. It is found in small streams of fresh water, and in canals about rice fields; seldom in larger or more rapid waters; and seldom grows to the length of a foot. It is a great nuisance everywhere, as it is an inveterate eater of spawn and small fry. This fish is everywhere confounded with the pike, which, although of the same origin, is of a far nobler race.

Pond Pickerel; Doree (Canada). The common pond pickerel thrives wherever he can get a foot-hold, and is found in nearly all the ponds and streams of the north that have not been jealously guarded against his intrusion. He seldom attains the weight of a pound, and is caught very readily with a red ibis fly on a light rod, affording a very fair amount of sport; but he is so bony and so small that he is hardly worth cooking when caught. His back is of a greenish grey, sides yellowish green, reticulated with oblong, irregular markings, fins of a deep yellow or red color. Spawns in March and April.

PIKE. This, with the trout, may be considered the universal fish of the world. It appears to inhabit the inland waters of all northern countries. We read of them as far back as the days of ancient Rome. The pike is called the "tyrant of the waters," the wolf fish and the fresh-water shark, and certainly from his ravenous disposition he deserves all these names. Many stories are told of the wonderful powers of this fish to devour all others smaller than it, and it is even claimed when one was put in a pond with an abundance of fish, in one year devoured all but one, which was a carp weighing nine pounds, and he had taken a piece out of him.

RED HORSE OR LAKE SUCKER. A large red-finned sucker weighing from one to six pounds. Often eaten fresh, but much better corned; very bony. They are quite a handsome fish, like many of the family. It is taken only with spear, seine and snare—the latter method being the best. On very hot, sultry days they swarm by the acre, playing, jumping and tumbling on or so near the surface as to be plainly seen. In Lake Pepin they are described as so numerous that not a foot of water for acres in extent is undisturbed. They spawn early in spring. The young are much valued for bait, and are well adapted for the aquarium.

SALMON. The salmon is the finest game fish in the world, without doubt, and few are the anglers who will not readily yield him precedence. It was known to the world as early as the ancient Romans. The interest taken in him for this reason, has caused much attention to be paid to his propagation, and stimulated a careful study of his habits, which were comparatively unknown until within the present century. The opportunities which the culture of this fish has afforded for investigation have now made the subject familiar to every one interested in ichthyology. The salmon's existence, like man's, is divided into four periods—infancy, youth, manhood, and ripe old age, and these several stages of fish-life are designated by the names of Parr, Smolt, Grilse, and Salmon. One portion of this existence is passed in salt water, and the remainder in fresh; in salt water he feeds and grows fat, and in the fresh expends his strength and vital forces. The salmon is a leaper. Leaping is his favorite expedient to detach the fly from his jaws; so, when he leaps, deferentially lower the tip of your rod and save your fish. In gaffing, coolness and dexterity are required; never jerk your gaff violently, but lift it sharply upward and inward, endeavoring to fix the point abaft the shoulders. No anathemas will compensate for the loss of a fish by the clumsy handling of the gaff after a persistent battle of an hour's duration. They love to haunt the rapid rivers or large lakes with sandy or pebbly bottoms, that run into the sea. They will best take the bait early in the morning or late in the evening, and when there is a light breeze on the water.

SHEEPSHEAD. This fish is of a semi-oval form, head large, body a silver grey color, marked by seven transverse bluish-black bars. The old fish become more dusky. They weigh as high as 17 pounds, and are found in all Florida waters, and as far north as Massachusetts.

SHINER, SHINY DACE, FALL FISH. Colors very brilliant, having as ground a very pure silvery white; back is often steel blue, and sides of head bright rose color. In spring and summer the adult males have rosy shades, and the dorsal and pectoral fins are crimson. Length 12 inches. Specimens have been caught weighing five pounds. Much esteemed as food, and affords good sport for the angler.

SISCOWET, or SISKOWITZ. Head large, nearly one-fourth total length. Snout obtuse and rounded. Two rows of teeth on the tongue. Depth of body at first dorsal equal to one-fifth total length. Scales small, larger on lower region of the body. Color resembles somewhat the Mackinaw trout, from which it may be recognized by its different opercular apparatus. The Siscowet spawns in August and September, and always in deep water; in fact, the fish is never taken in much less than 40 fathoms. The fattest of all known fish, it has no unpleasant or oily odor, and for the table is much valued. This fish has been extensively maligned as unfit for eating in a fresh state, as being insufferably oily and rank, though all united in its praise when salted. It inhabits Lake Superior.

SMELTS. The fresh water smelts are identical with the sea smelts, having been introduced into fresh waters and acclimated there. They take the hook freely in February and March, and afford lively play for light tackle.

SUCKERS. Some of the suckers, of which there are many varieties, afford much sport when snared. The snare is a running loop of fine brass wire attached to the end of a pole, and the method employed to capture the fish is to beat the water with long sticks, turning up logs and large stones, tossing stones into the holes, etc., so as to drive the fish from under the banks and other hiding places into the mid-stream, where they can be readily seen. They will lie quietly on the bottom for awhile after being disturbed, and then the snarer passes the wire loop cautiously over their heads, and dextrously jerks them out to *terra firma.* Sometimes the suckers will take the baited hook, though very seldom. No less than 12 varieties of suckers are enumerated as belonging to northern waters, averaging a foot in length; the most prominent of which—

The *Mullet Sucker*, grows to a length of 18 inches. It is very common in Lake Erie, where it is severally called the Mullet, Golden Mullet and Red Horse. There is also a common species in Lake Erie, very black in color, which is called the Black Sucker, and the Shoemaker.

The *Chub Sucker*. Color olivaceous; smoky above; a blackish band from pectoral to superior extremity of gill opening. Length eighth inches. Lives in the rocky parts of running streams, and feeds on Physalis and other small fish.

The *Long-finned Chub Sucker*. Scales variegated with blue, yellow and green; all the fins are grey-blue. Length 20 inches. A good edible fish.

Horned Sucker is common in most of the fresh-water streams of the Middle States and New England, where it is known as barbel, dace, and horned dace. It takes a hook readily, and begins to bite in April. Some suckers seem to be peculiar to certain localities, showing quite distinctive characteristics as to color and size. The Oneida Lake sucker is a bluish brown fish on the back; lighter beneath; a much lighter colored fish is very abundant around Peekskill on the Hudson; and others in the Mohawk and Susquehanna rivers show like variations in color. The dace or shiner is quite common also. It is a large-scaled fish, silvery white, and is taken with hook very often in New England trout streams. Another species of horned sucker is a small fish reaching nine or ten inches in length. Head dark olive green; back and sides of body green; sides tinged with yellow; anal fin blackish brown, caudal lighter, and the remaining fins light olive green. Sometimes called mullet.

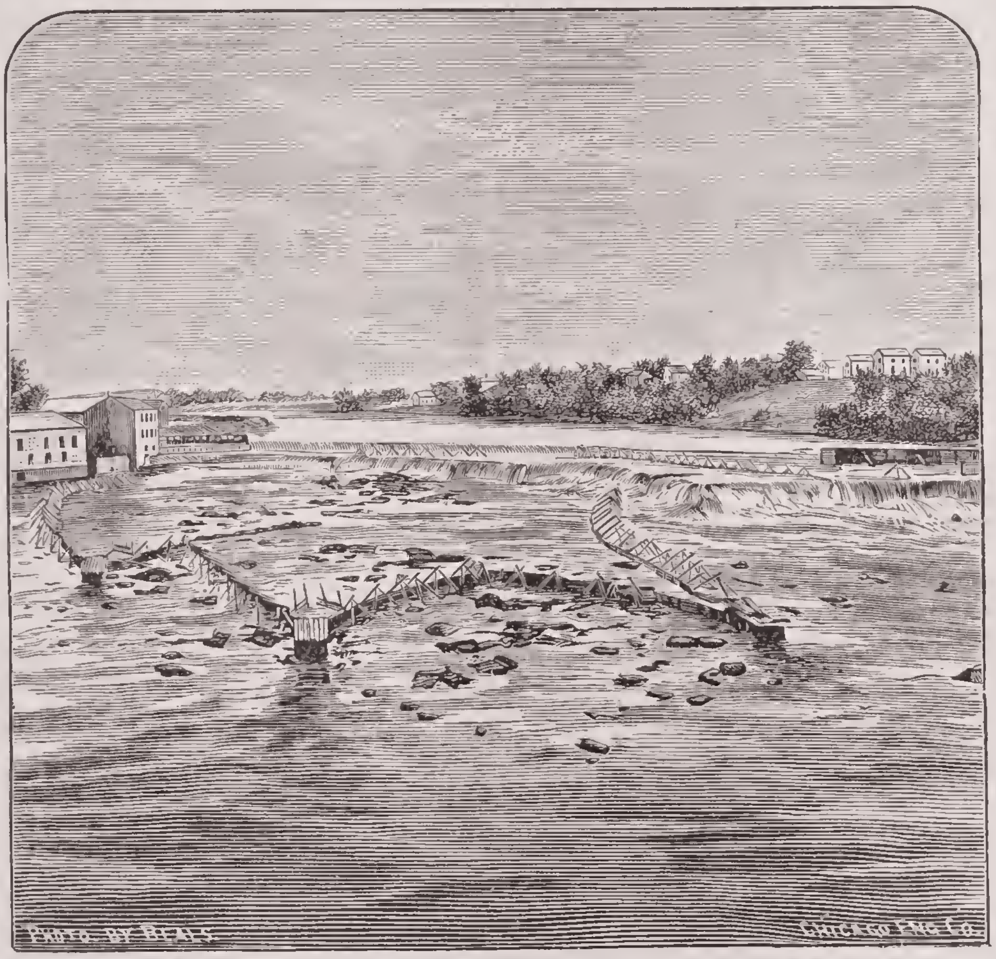


Fig. 13.—*View of the Weirs at Fulton, N. Y., Below the Upper Dam, from the Bridge.*

Sun-Fish. Common everywhere, and known to every school-boy from Maine to Florida. A very beautiful fish, olive brown black with a light shade of green, marked with irregular spots of reddish-brown; sides and belly yellow with brazen spots. Fins yellow. The opercle or gill cover has a bright vermilion spot like sealing-wax on its edge. Inhabits still, clear waters, regardless of temperature, spawns in spring, fashions her nest in the sand or gravel, in shallow water near the margin of ponds, and jealously guards it from every intruder. It takes bait, and sometimes a fly or troll, though seldom. It sometimes reaches a pound in weight, and is then very good for the table. There are several closely-related species found in the Southern States, in company with the above, and with the same habits. Color greenish-yellow, dark on back.

Trout. Fishes of quite different genera go under this name, all of which are very popular as food for man.

Mackinaw or *Lake Trout.* Prof. Milner says that "this fish may be readily taken with the hook baited with a piece of fish, but as they are ravenous feeders, almost any kind of bait will serve the angler's purpose, who will however derive little sport from their capture, as they are excessively dull and sluggish." Professional fishermen capture them with lay-out lines and nets. His great size and immense strength alone give him value as a fish of game; but when hooked, he pulls strongly and fights hard, though he is a boring, deep fighter, and seldom, if ever, leaps out of the water like the true salmon or the brook trout.

Nevertheless, trolling for trout is a favorite pastime of the residents and tourists of Northern Michigan. It is said that the Mackinaw trout bites best when it is fullest. Large and solitary specimens are frequently taken—sometimes with the gaff alone—while swimming at the surface of the water. These are known as "racers," and are always thin. The average weight is about five pounds, but monsters weighing from 60 to 100 are heard of. The spawning season begins in October and ends early in November. But very little seems to be known of their habits at this season. Rock bottoms are usually, but not always, preferred. A clay bottom near St. Joseph, Mich., is said to be frequented by trout for this purpose.

Color, dusky brownish grey; chin and under parts light ash or cream color. Back and sides speckled with numerous irregularly shaped spots of lighter grey, brown, or soiled white. Lower fins faint yellow. Resembles Siskowet, but has more pointed chin and snout, more deeply forked tail and larger head.

Habitat, Lake Superior, Lake Michigan, Lake Huron, and probably in all the great lakes which lie between the United States and the Arctic Sea.

Common Speckled Trout or *Brook Trout.* Symmetrical, oblong body; back broad, with dark markings on horn-colored ground, with metallic bluish and greenish reflections in fresh specimens; sides lighter, merging into white on abdomen, which shows reddish in the spawning season. Upper part of head dark greenish brown, with somewhat obscure mottlings; red vermilion dots and large yellow spots in the vicinity of lateral line. The pectoral or breast fins have the first ray yellow or the second black, the rest orange. The caudal or tail fin is slightly forked in the adult; more so in the young; is reddish, with parallel dark bands.

Fig. 14.—*View of the Eel Wiers at Fulton, N. Y., Above the Upper Dam, East Side.*

The range of this well known and much valued fish is strictly between the parallels of latidude 36° and 50° north. Its northwestern limit is Northern Minnesota, and it is not caught west of the Mississippi river except in a few of its Minnesota tributaries. Specimens have been taken that weighed seventeen pounds. The largest are found in Maine and in the Nepigon river, on the north shore of Lake Superior, where the specimen referred to was caught. It inhabits large lakes and the smallest ponds, the tiniest brooks and the largest rivers. Although a bold biter, it is a wary fish, and often requires much skill to capture it. It can be caught with artificial or natural flies, minnows, crickets, grasshoppers, grubs, the spawn of other fishes, or even the eyes or cut pieces of other trout. It spawns in the fall, and its period of spawning ranges from September to late in November. The older they grow the more wary they become, and therefore it requires considerable skill to catch a very old trout. A worm is, generally speaking, the best bait for them; but in the spring, after the rains that usually prevail at that season, which wash a great many worms and insects into the water, very few of which escape their observation, they bite better at the more tempting bait of a fly.

Pacific Brook Trout; Mountain Trout. This species may be taken with almost any kind of bait. It will rise readily and greedily to the fly or the grasshopper; raw meat is good, the eye of a fish excellent; grubs, larvæ, and worms, all seem to be eagerly desired. Suckley has taken them by trolling with a "belly fin of a fresh-killed fish." There is a peculiarity of this fish and its western congeners regarding location, which is worthy of mention. Unlike the eastern trout it seems rather to prefer moderate currents of water, or indeed pools which are absolutely still, and this fact should be remembered by those who fish. This specimen attains a weight of from four to six pounds, and is in good condition for the table from spring until near Christmas, at which time they begin to spawn. In the large mountain streams of Kern river, California, where the trout reach a weight of seven pounds, a spoon bait often proves very taking. Early in the season any or all baits suffice, but later, when the trout get thinned out, they are very shy and difficult to tempt with anything.

Pacific Red Spotted Salmon Trout; the *Dolly Varden.* This species inhabits chiefly glacial waters; is found in the northern streams of California and as far north as Alaska. They have whitish yellow spots just below the back, and red spots above the belly. Tail forked. It takes the bait greedily, and rises readily to the fly.

WHITEFISH. The *Lake Whitefish* is among the best of lake fish, being second to the Siscowet, and by many pronounced equal to the great trout. The spawning begins in November, terminating in December, and is indicated by the fish leaving deep water and appearing in immense numbers on rocky shoals.

The average whitefish is of two or three pounds weight; a large one six or seven; rare specimens are caught, however, of much greater weight, sometimes turning the scales at 20 pounds. Those of Lake Superior and the Straits are larger, fatter and finer in flavor than those of the lower lakes. In the rapids of Sault Ste. Marie they are taken in large quantities by the Chippewa Indians in dip nets, and are of a very superior flavor. The fish of Lake Huron and Upper Lake Michigan are very fair, but those of Lake Erie are decidedly inferior, which is probably due to the difference in temperature of these waters.

Whitefish do not take the hook readily, and the opinion has been entertained that they could not be caught in this fashion. Nevertheless, they have afforded good sport to the angler with a fly-rod baited with the May-fly, and worms have also been used with success. The whitefish of the Rocky Mountains take flies as readily as trout, and so do some of the eastern whitefish at certain seasons of the year.

MISCELLANEOUS. *Archer Fish.* The chelmons are a species of fish indigenous to the Indian Ocean. This fish has a scrupulous way of obaining its food, which has earned for it the name of archer fish, or fish pump. It frequents the mouths of rivers and especially shallow places, in search of insects which exist on the marine plants the stalks of which rise a little above the surface of the water. As soon as the fish spies its prey, it approaches cautiously as near as possible, and then, raising its snout above the surface, squirts out a fine stream of water with considerable force and unerring aim. The jet is often projected over a distance of six feet. The insect struck is stunned and falls into the water, and then is easily captured by the chelmon.

The representative of another group of Archer fishes, and to which the name is more specifically applied, is shown by Fig. 2. Although the mouth of this fish is entirely different in formation from that of the chelmon, it takes its prey in a precisely similar manner.

The *Kingo*, one of the most beautiful varieties of the golden carp probably ever bred, was imported by Mr. Gill, of Baltimore, from Japan, at a cost of $500. Too much can hardly be said of the wonderful beauty and grace of this fish. Its sides are resplendent with delicate pearly and golden tints, which, as it moves through the water with great dignity, are constantly changed in degrees of color under the varying angles of light.

Climbing Fish, of India. The famed "climbing fish" is the type of the family of Anabantids, a family distinguished by some remarkable peculiarities, such as the mode of respiration and the strange modifications therefor; the singular nest which they make for their eggs; the care they take of their young, and their wonderful ability for climbing, etc.

EEL. The eel has long figured as one of the most mysterious of animals. For 2,282 years it has been the object of more or less discussion. Aristotle maintained that it "is born of worms produced by mud;" Pliny, "that it rubbed itself against rocks, from the fragments of which young eels are born." Thus, from the fourth century before Christ to the year 1873, the eel has been the afflicted object of all manner of absurd theories. The eel industries of the Oswego river, New York, are nearly 100 years old. Toward the close of the eighteenth century John Van Buren erected a log hut in the woods along the Oswego river. This region was then in its native wildness. People came in and made homes around him, when he started a fishery. There are five great fisheries on the Oswego river and its tributaries, situated at Battle Island, Fulton, Horse-Shoe Dam, Jack's Rifts, and Caughdenoy. Battle Island, where the fisheries originated, has been continuously fished for over 80 years. At Fulton the river has been fished for 50 years. The largest catch ever made was 1,150 pounds in one night, an equivalent of 800 live eels. The Northern and Western cities are supplied with eels from this point.

Fishing. Angling for fish, whether for pleasure or profit, is so ancient that the knowledge of man is too short to reach the first angler. In modern times the art has been made captivating and gracious by the musings of the pensive and philosophical Walton, and now, in all sportsmen's circles, fishing is a polite and dextrous pastime. It has of late years been so nearly reduced to a science that the true angler will condescend to fish only with the artificial fly. Several particulars must be observed if one would be a skillful and successful angler.

ANGLING AND TROLLING. In fly-fishing the object is to throw the fly well out, and dropping it on the water as gently and naturally as possible, to keep it playing in the eddies like a drowning insect, till it attracts the attention of a lurking trout, and tempts him to strike at it. He is then hooked by an indescribable motion of the wrist—not the arm—only to be learned by practice. As an attempt to land him at once would break the line, he must be played till exhausted, when he can be gently brought to the shore. Besides the trout and salmon, the fish most valued in this country by the angler, are the several varieties of pike and bass, the pike-perch (glass-eye or Ohio salmon), the common perch, the carp, and many other varieties, ranging in size and excellence down to the little many-colored pond-fish. Bait fishing is suited to sluggish water rather than to swift-running streams. To bait the hook, take it in the right hand, the bait in the left, entering the hook at the head of the worm, and carrying it through to near the tail, so as to cover both the entire hook and its fastening. The worm should appear as life-like as possible, and all breaking and bruising should therefore be guarded against. There must not, however, be too much spare worm left at the end of the hook for the fish to nibble at without taking all in. When throwing the baited line, do it forward and upward, so as not to splash, and allow the bait to fall gently on the surface, and sink slowly in the water to the required depth. Watch the cork carefully as the line floats slowly down stream. When you barely feel a nibble do not be too ready to jerk; let the fish have time to take in the bait, hook and all; then a slight, quick motion will hook the fish, and you can land him at your leisure. Trolling and spinning are generally practiced with dead fish for bait, to which a motion is given as if the fish were swimming. There are several methods of trolling, namely, with the lead hook, formed of two single hooks tied back to back, with a little bead of lead fixed to a link or two of chain depending from the lower part; the snap-hook, spring or plain, made of three hooks fastened together; and the gorge hook, which is loaded in the shank with lead. Spinning swivels are a series of small hooks, tied on fine gut, and applied to the bait externally, fastened to the line head upward, with a slight curve given to the tail, so that the action of the swivel and the force of the current revolve it in the water, increasing its naturalness and making it more tempting. Trolling is chiefly used in still waters for pike; spinning in swift running streams, where it is equally luring to salmon, trout, pike, or large perch. Spinning requires the greater skill and delicacy of touch, and is the finer sport of the two.

In trolling the shiner is the best lure. In arranging it, put the single hook through the lip, the middle hook in the belly, and the end hook in the tail. Loop on the leader about 36 inches from the fish; loop a large fly to the leader; some loop on a smaller one 30 inches from the other. For a leader, use twisted gut, with a small swivel attached to one end. The other end is fastened to a reel-line either by loop or knot; but a knot is preferable. The leader should be two yards long; some use three yards. The train of hooks is attached to the eye of the swivel at the end of the leader. It is made with fine hooks, and of the best gut. The strand on which the hooks are tied are fastened by a knot to another equally strong strand, and this is fastened by a loop to the swivel at the end of the leader. Trolling is done solely by boat. The troller sits with his face to the stern, the oarsman in the middle or near the bow. The rowing must be done slowly, one to two miles an hour. Row out 45 or 50 yards. When the fish is felt, tip the rod and cast off so that the fish shall have time to take hold. Then give a good surge, and you will rarely miss him. If you have two rods, when you feel the fish, pass the other rod to the oarsman. Never give an inch to the fish if you can help it, but be easy and gentle after you have fastened him, and let him play till he is exhausted; then pass the gaff under the fish, point downward, turn up the inside, and strike as near the shoulders as possible. Use no sinkers in trolling.

For fishing with set-lines, in the lake, bait with pieces of shiners or lake herring. Anchor one end of the line near the shore, in 15 feet of water. Run it out into the lake one-fourth to two miles. For the line use strong hempen cord, and whip-cord for bait lines. The hooks are attached every sixteen feet. For baiting pike, use roach, dace, gudgeon, small chub, trout, skegger or brandling. Go out each morning, pull up the lines, take off the fish that have been caught, re-bait the hooks, and drop back into the water. The position of the lines is marked by buoys.

In baiting for fish, the following hints will be useful: In fishing for trout, use any small fish, especially its own fry. For perch, use minnows, shiners and small trout. For carp, taken by deep-bottom fishing, use a bright red worm. For black bass, fished with the fly, the gorge-hook, and trolling tackle, shiners are the best bait. For small rock bass, use minnows and small shiners.

For catching eels use a strong gut line, a light float and a No. 9 hook. Bait with a large, red worm. Let the bait touch the bottom. The most alluring bait is salmon-roe. When fishing for eels with night-lines, lay in streams, or still deep holes in rivers.

In the winter, when the water is covered with ice so clear that fish are plainly visible beneath, they may be stunned and caught by striking on the ice with a mallet immediately above them. Winter fishing through holes in the ice is also rare sport, when it is not too cold.

Rods. There is perhaps no article of tackle upon which the angler looks with so much pride and pleasure as a good rod; like the fowler's gun, or the jockey's horse, next to his wife, they are always the best. Rods are made of various kinds of wood and of various length. There are three requisites for a good rod, viz.: strength, lightness and uniform flexibility from the butt to the top. They should vary in length and flexibility to suit the habits of different kinds of fish. A 16 or 18 foot rod, strong and rather stiff, is best for salmon; while one 10 to 14 feet, long, light and springy, and finely tapering, is sufficient for trout. The Cruttenden fly rod, Fig. 15, has a solid reel plate, nickel-plated, patented ferrules, allowing the wood to be used full size, thus preventing rod-breaking where wood and ferrules join. It is well ringed throughout, wound with silk, and finely polished. Length 10½ feet, and weight about 10 ounces. A rod for trolling with minnow, and a rod for worm-fishing, should be about the same length as above, but the trolling-rod should be stronger. A bamboo rod, with changeable top, joints of various degrees of length, strength and elasticity, that can be adapted to the various purposes of fly-fishing, trolling, and bottom-fishing, is very convenient. The reel or "pirn" at the bottom end of the rod, on which the line is wound, should be simple, and made so as to wind and unwind handily.

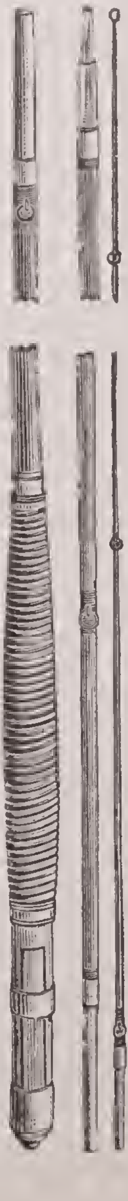


Fig. 15.—*Cruttenden Fly Rod.*

Lines. These are made of silk, silk and hair, gut, India grass, flax, hemp, and cotton. They are made of various sizes and lengths, from the size of a hair to that of a quarter of an inch, and from 12 to 200 yards in length. The size and length of the line should vary in proportion to the sport anticipated. A line for trout should be either of silk, silk and hair, India grass, or fine flax, and from 12 to 20 yards long. For salmon, lake pickerel, black or striped bass, the lines generally used are made of flax, hemp, silk, or hair from 50 to 200 yards. For "trolling" for blue fish, bass, pickerel, or any kind of sea-fish, the cotton and hemp lines are used. One had better choose a heavy line, for the sake of its casting superiority and advantages in windy weather.

HOOKS. This article is of the greatest importance to the angler, and about no part of the sportsman's or fisherman's outfit is there such a variety of opinion as the hook. In selecting a hook, bear in mind that a large portion of your success depends upon the quality, and therefore take particular pains and see that they are well tempered. Test every hook before attaching it to the line, and see that the barb and point are perfect and sharp. A small file will be found handy for sharpening. Hooks range in size from No. 1, several inches in length, down to No. 14, about a quarter of an inch long. Limerick, Dublin 2 F's, and 2 B's, Clark's patent, Kindal or Redditch hooks are good.

BAIT. The most common bait used in this country for ensnaring almost all species of the finny family that inhabit fresh water, is the common earth-worm, or, as it is called, dew-worm, dug-worm, and the angle or fish-worm. The common white grub-worm is also good bait, and will often take trout when all others have failed. These may be procured in the spring of the year in decaying trees, stumps, foliage, etc., and sometimes in fresh ploughed ground. The grasshopper is an excellent bait for trout. Wasps, beetles, flies, caterpillars and many other insects make good trout bait. The hind legs of the frog, when skinned, makes excellent bait for pickerel.

For bait, minnows are good enough for many species of fish, even for trout. pickerel or salmon. The best vessel for carrying them is a pail made for the purpose, Fig. 16. It is made of heavy tin, with detachable cover, and is 10 inches by 10 inches. The inner pail is 9x9, with tinned wire bail and brass wire spring catch. Artificial flies are the most important lures used by the angler. They are made to somewhat resemble an actual live fly, and are made from cocks' hackles or other feathers to form wings. The fur of a rabbit's ear, or some other animal, to form the body, and waxed silk thread to tie the whole in an artful, neat manner to the shank of the hook, and the lure is complete.

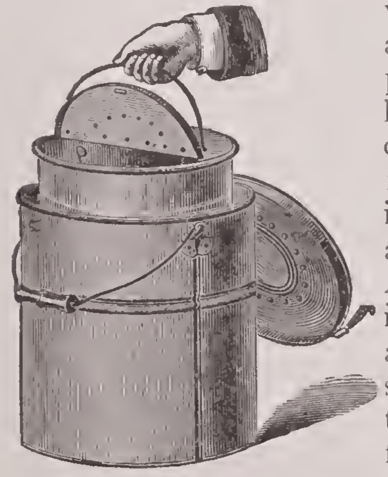


FIG. 16.—*Minnow Pail.*

SINKERS, DIPSIES or LEADS, and SWIVELS, etc. There are three kinds of sinkers in use, the plain, slide and swivel. The first is made of lead, with brass wire loop at each end, and of various sizes and weights. The slide sinker is nothing more than a lead tube, slightly rounded at each end. It is used principally in bottom fishing, the object of the tube being to allow the line to pass through it at the least motion of the fish, which is thus immediately felt. The swivel sinker is the best for any kind of fishing. It is made similar to the plain, with the exception of the swivel at each end instead of the stationary loops. Split shot are used almost universally for trout fishing. They should be quite small, and where great weight is required, a larger number should be used rather than those of a larger size. Swivels are used for "spinning" bait and for preventing entanglement of the line.

FLOATS. These are made of cork, quills, and red cedar, of various sizes, adapted to the current of water or the peculiar description of angling. They are of two shapes, egg and oblong.

REEL. Many old fashioned anglers think that this is a superfluous article in the equipment of a sportsman, but to those who have used it, it is almost as indispensable as the rod itself. The main object of the reel is to give the fish a sufficient quantity of line to tire itself, and consequently affords more sport than could be obtained by the rod alone. By means also of the reel, fish of greater weight may be captured than could possibly be with the rod.

Fig. 17 is a representation of the Orvis reel. It is extra heavily nickel-plated and finely finished. Is perforated to make it light, and keep it free from sand and dirt; also that the line may dry without removing it from the reel after use. Has a perfect click, is very light, very strong and holds from 40 to 50 yards of line. It is more compact and less cumbersome than ordinary 20-yard reels. It is quite narrow and takes up line rapidly.

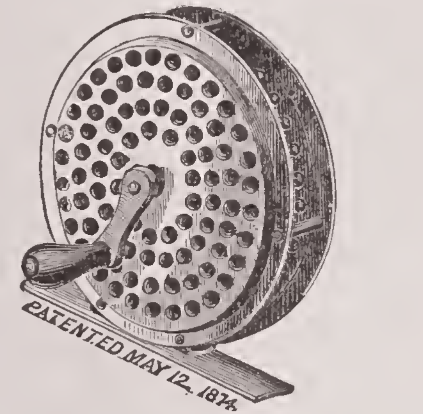

PATENTED MAY 12, 1874.

FIG. 17.--*Orvis Reel.*

The reel of Fig. 18 supplies a want that has long been felt by fishermen. In size, weight and general appearance it does not differ from the reels in ordinary use. The line is withdrawn from it as from the common reel to any desired length for fly casting or bait fishing. It is when a game fish is "struck" that the advantages of the automatic reel become more appar-

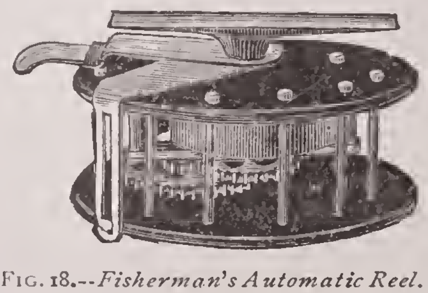


FIG. 18.--*Fisherman's Automatic Reel.*

ent. By a movement of the finger an instantaneous tension of the line is produced, so delicate that if the angler chooses to allow it, and the fish be obstinate, he can run out the whole length of the line; but it will be against a continually increasing resistance, more or less augmented as may be desired. If, when at any distance, the fish makes a charge in the direction of its captor, no matter what his rate of speed may be, the reel takes up the line so rapidly that no slack can possibly be obtained. All this is accomplished without the use of a crank. The reel designed for fresh water bass or pickerel fishing, carrying from 100 to 110 feet of line, works equally well in capturing brook out.

PRESERVING FISH. Besides the well-known ways of preserving fish by salting, drying, smoking and canning, here is one that anybody can try who wishes to preserve fish in its fresh state: Open the fish, sprinkle sugar over the interior, keeping the body in a horizontal position so that the sugar may penetrate as much as possible. It is said that fish preserved in this way can be kept completely fresh for a long time, the savor being as perfect as if recently caught. Salmon thus treated before salting and smoking possesses a much more agreeable taste. A tablespoonful of sugar is sufficient for a five-pound fish.

Fish, TO COOK. All fish should be thoroughly cleansed and well cooked; nothing can be more unwholesome and more unpalatable than fresh fish not sufficientiy cooked. Fresh fish, when boiled, should be placed in cold, and shell-fish in boiling water. To keep oysters after washing them, lay them in a tub in a cool cellar, with the deep part of the shell undermost. Sprinkle them with salt and Indian meal, then fill the tub with cold water. Change the water every day and the oysters will keep fresh a fortnight. Fish should be garnished with horse-radish or parsley. The only vegetable served with fish is potatoes. It is customary to eat fish only at the commencement of the dinner. Fish and soup are generally served up alone, the soup first, before any of the other dishes appear. Let great care be taken to well clean the fish before it is dressed. Fresh-water fish have often a muddy taste and smell, which may be got rid of by soaking them in strong salt and water before they are cooked. Salt fish should be soaked in water before boiling, according to the time it has been in salt. When it is hard and dry, it will require 36 hours in soaking before it is dressed, and the water must be changed three or four times. When fish is not very salt, 24 hours, or even one night, will suffice. Baked fish is apt to be dry, and can be improved by basting it with a little good fat or olive-oil, or by laying a slice of salt pork over it, or strips of pork in slashes cut in its upper surface. Blue fish, bass, shad, carp, red snappers, and other fish from three to six pounds in weight, are good for baking; brown gravy or sauce should be served with baked fish, and a highly seasoned bread stuffing increases their palatability. The best of fried fish are those cooked in oil; small fish should be rolled in flour, seasoned with salt and cayenne, and quickly fried; medium-sized or sliced fish are good for frying when rolled in Indian meal or cracker-dust, seasoned with salt and pepper, and fried.

The general method of BOILING fish is to put it in the saucepan, and a little more than half cover it with boiling water. Cover the lid closely and boil gently until done. To determine when a fish is sufficiently boiled, draw it up upon the fish-plate, and if the thickest part of the fish can be easily divided from the bone with a knife, it should be at once taken from the water. A little saltpeter or a few spoonfuls of vinegar may be added to the water to render the boiled fish firm. Some cooks prefer to steep the fish in salt and water from five to ten minutes before putting it in the kettle to cook, instead of putting salt in the water in which it is to boil. By this means less scum rises.

TO BROIL FISH. Let one day expire after it has been caught and killed, then lay the inside on the gridiron, and not turn it till it is nearly done.

TO FRY FISH, cleanse them thoroughly, dry them on a folded cloth, dredge flour lightly over them, brush them with a well-beaten egg, then dip them in fine bread-crumbs. Have ready enough fine oil, or melted lard or beef dripping (clarified), to entirely cover the fish. Place the frying-pan over a clear fire. Let the lard reach boiling point, and then immerse the fish in it. You may try whether the fat is hot enough by letting a drop of cold water fall into it from the end of your spoon. If the hot fat spits it is ready for use. Then fry, turning the fish when one side is browned to the other. When it is done, serve it extremely dry on a white cloth or embossed fish paper.

To prepare very bony fish for children to eat, cut out the large bones or slip them out after boiling a while, then fry the flesh to a crisp, when all the fine bones will be chewed up before they are swallowed.

TO BAKE A LARGE FISH WHOLE, cut off the head and split the fish down nearly to the tail; prepare a dressing of bread, butter, pepper and salt, moistened with a little water. Fill the fish with this dressing, and bind it together with fine cotton cord or tape; lay the fish on a grate or a bake-pan or a dripping-pan, and pour around it a little water and melted butter. Baste frequently. A good-sized fish will bake in an hour. Serve with the gravy of the fish, drawn butter or oyster sauce.

CATFISH, *To Fry*. Skin, clean, and remove the head; sprinkle with salt, and lay aside for an hour or more; have ready two or three eggs beaten to a froth, and, in a flat dish, a quantity of powdered cracker; dip the fish first in the egg, then in the cracker, and fry quickly in hot lard or drippings; take up as soon as done. Catfish cooked in this manner are sweet and savory—a trifle too rich for delicate persons, but very nice for those who are blessed with good digestion.

Another: Skin and split them, remove the backbone, wash and dry the pieces, season them with salt and cayenne pepper, dredge them with flour, and fry them brown in smoking hot fat.

To Stew. Skin, clean and cut off the heads; sprinkle with salt to remove any muddy taste they may have contracted from the flats or holes in which they have fed, and let them lie in a cool place for an hour or so; then put them into a saucepan, cover with cold water, and stew very gently for from ½ to ¾ hour, according to their size; add a chopped shallot or butter-onion, a bunch of chopped parsley, a little pepper, a large tablespoonful of butter, a tablespoonful of flour mixed to a paste with cold water; boil up once, take out the fish carefully, and lay in a deep dish; boil up the gravy once more, and pour over the fish; send to table in a covered dish.

Salt Cod, *To Boil.* Put the fish to soak over night in lukewarm water, as early as seven o'clock in the evening; change this for more warm water at bedtime and cover closely; change again in the morning and wash off the salt; two hours before dinner take out the cod, examine to see that no crystals of salt adhere to the under side, and place it in very cold water to make it firm; set it over the fire in lukewarm water enough to cover it and boil for ½ hour; drain well, lay it in a hot dish and pour over it egg sauce, when it is ready for the table. What is left over from this dish will be excellent for codfish balls.

Codfish Balls. After preparing as above for boiling, cut it in pieces and boil 20 minutes; turn off this water, pour on boiling hot water and boil 20 minutes more; drain very dry and spread upon a dish to cool; pick to pieces with a fork, removing every vestige of skin and bone and shredding very fine; add an equal bulk of mashed potato, a little butter, sweet milk and beaten egg, and work into a stiff batter; flour your hands and work into balls or cakes, and fry to a light brown in boiling lard or dripping. Plainer fish cakes are often made by simply molding shredded cod and mashed potatoes together. Codfish ready boned, and sometimes shredded also, is to be found at groceries, under the name of "desiccated codfish." No adulteration of it is yet known.

Eel, *To Boil.* Take small specimens, boil them until tender, with a bunch of parsley; serve with butter sauce.

To Stew. Inquire, before buying, where they were caught, and give so decided a preference to country eels as to refuse those fattened upon the offal of city wharves. Nor are the largest eels the best for eating. One weighing a pound is better for your purpose than a bulky fellow that weighs three. Skin and clean, carefully extracting all the fat from the insides; cut into lengths of an inch and a half; put into a saucepan, with enough water to cover them; throw in a little salt and chopped parsley, and stew slowly, closely covered, for at least one hour; add, at the last, a great spoonful of butter and a little flour wet with cold water; also pepper; serve in a deep dish. The appearance and odor of this stew are so pleasing as often to overcome the prejudice of those who "wouldn't touch an eel for the world! they look so like snakes!" and those who have tasted once rarely enter a second objection.

To Fry. Prepare and wash the eels, wipe them thoroughly dry, and dredge over them a very little flour; if large, cut them into pieces about four inches long, brush them over with egg, dip them in bread-crumbs, and fry them in hot fat. If small they should be curled round and fried, being first dipped into egg and bread crumbs. Serve them up garnished with fried parsley.

To Bake. Skin, empty, and thoroughly wash four large eels, cut off the heads, and divide them into rather short pieces, wipe them very dry, dip each piece into a seasoning of cayenne, salt, minced parsley, and a little powdered savory herbs; put them into a deep dish, cover them with veal stock, put a thick paper or cover over the dish, and set it in the oven until the eels are tender. Skim off the fat, take the pieces of fish carefully out on a hot dish to keep warm, and stir into the gravy the wine, strained lemon juice, and sauce; make it just boil up, and pour it over the fish. Garnish with sliced lemon.

Halibut, *To Boil.* Lay in cold salt and water for an hour; wipe dry, and score the skin in squares; put into the kettle with cold, salted water enough to cover it. It is so firm in texture that you can boil without a cloth, if you choose; let it heat gradually, and boil for ½ to ¾ of an hour, in proportion to the size of the piece. Four or five pounds will be enough for most private families. Drain and accompany by egg-sauce —either poured over the fish, or in a sauce-boat. Save the cold remnants of the fish and what sauce is left until the next morning. Pick out as you would cod, mixed with an equal quantity of mashed potato, moisten with the sauce, or with milk and butter if you have no sauce; put into a skillet, and stir until it is very hot. Do not let it burn. Season with pepper and salt.

To Bake. Take a piece of halibut weighing 5 or 6 pounds, and lay in salt and water for two hours; wipe dry and score the outer skin; set in the baking-pan in a tolerably hot oven, and bake an hour, basting often with butter and water heated together in a sauce-pan or tin-cup. When a fork will penetrate it easily it is done. It should be of a fine brown. Take the gravy in the dripping-pan, add a little boiling water; stir in a tablespoonful of Worcestershire sauce, the juice of a lemon, and thicken with brown flour, previously wet with cold water; boil up once and put into the sauce-boat. There is no finer preparation of halibut than this, which is, however, comparatively little known. Those who have eaten it usually prefer it to boiled or broiled. You can use what is left for the same purpose as the fragments of boiled halibut.

Halibut Steak. Wash and wipe the steaks dry; beat up 2 or 3 eggs, and roll out some Boston or other brittle crackers upon the kneading-board until they are fine as dust; dip each steak into the beaten egg, then into the bread crumbs (when you have salted the fish), and fry in hot fat, lard or nice dripping. Or, you can broil the steak upon a buttered gridiron over a clear fire, first seasoning with salt and pepper. When done, lay in a hot dish, butter well, and cover closely.

Cutlets of Halibut, Cod or Salmon. Three pounds fish, cut in slices ¾ of an inch, from the body of the fish; a handful of bread crumbs, with which should be mixed pepper and salt, with a little minced parsley; one egg, beaten light; enough butter, lard or dripping to fry the cutlets. Cut each slice of fish into strips as wide as your two fingers; dry them with a clean cloth; rub lightly with salt and pepper; dip in the egg, then the bread crumbs, and fry in enough fat to cover them well; drain away every drop of fat, and lay upon hot white paper lining a heated dish.

MACKEREL, *To Cook.* Put into a crock (flesh side down), with plenty of water; let soak 8 to 10 hours before using. After thoroughly cleaning, put into a spider in cold water; bring to a boil, turn off water, then pour over it ½ cup of cream (sweet) and a piece of butter the size of an egg; bring this to a boil and it is ready for use.

To Boil: same as codfish.

OYSTERS, *Raw, To Prepare for Eating.* Select, by experiment, from the following seasonings: salt, pepper (black and red), vinegar, etc.

To Stew. Put the liquor in a saucepan upon hot coals; when it all boils up, add the oysters and pour in a little milk, or, if you choose, water, about a teacup to a quart of oysters. Let them boil 2 or 3 minutes, not more; meantime put in a small piece of butter, and dredge in some flour; set the saucepan off, and stir the oysters till the butter is melted. Lay some crackers or toasted bread in the dish, and pour on the oysters. They are very fine with roast or boiled turkey.

To Fry. Select the largest and best oysters you can find; take them carefully from the liquor; lay them in rows upon a clean cloth, and press another lightly upon them to absorb the moisture; have ready several beaten eggs, and in another dish some crackers crushed fine, in the frying-pan heat enough nice butter to cover the oyster entirely; dip each oyster first in the egg then in the cracker; roll it over that it may become completely incrusted; drop them carefully into the frying-pan; fry quickly to a light brown; if the butter is hot enough they will soon be ready to take out; test it by putting in one oyster before you risk the rest; do not let them lie in the pan an instant after they are done; serve dry, and let the dish be warm. A chafing-dish is best.

Scalloped Oysters. Crush and roll several handfuls of "oyster" crackers; put a layer in the bottom of a buttered pudding-dish; wet this with a mixture of the oyster liquor and milk, slightly warmed; next have a layer of oysters; sprinkle with salt and pepper; lay small bits of butter upon them, then another layer of moistened crumbs, and so on until the dish is full; let the top layer be of crumbs, thicker than the rest; beat an egg into the milk you pour over them; stick bits of butter thickly over it; cover the dish, set it in the oven and bake ½ hour; if the dish is large, remove the cover and brown by setting it upon the upper grate of the oven, or by holding a hot shovel over it.

PICKEREL, *To Fry.* The pickerel ranks next to the trout among game-fish, and should be fried in the same manner. Especially do not fry it slowly and too long; and when it is done take it out of the grease.

SALMON, *To Boil.* Put it into warm water instead of cold, in order to preserve its color and set the curd. It should be thoroughly well dressed to be wholesome; scale it; empty and wash it with the greatest care; do not leave any blood in the inside that you can remove. Boil the salt rapidly in the fish-kettle for a minute or two, taking off the scum as it rises; put in the salmon, first trussing it in the shape of the letter **S**, and let it boil gently till it is thoroughly done. Take it from the water on the fish-plate, let it drain, put it on a hot folded fish napkin, and garnish with slices of lemon. Sauce: shrimp or lobster. Send up dressed cucumber with salmon.

To Broil. Cut slices of an inch or an inch and a half thick from the middle of a large salmon; dust a little cayenne pepper over them; wrap them in oiled or buttered paper, and broil them over a clear fire, first rubbing the bars of the gridiron with suet. Broiled salmon is extremely rich, and really requires no sauce. The slices may also be simply dried in a cloth, floured and broiled over a clear fire; but they require the greatest care then to prevent them from burning. The gridiron is always rubbed with suet first.

To Bake. Wash and wipe dry, and rub with pepper and salt. Some add a slight taste of cayenne and powdered mace. Lay the fish upon a grating set over your baking-pan, and roast or bake, basting it freely with butter, and toward the last, with its own drippings only. Should it brown too fast, cover the top with a sheet of white paper until the whole is cooked. When it is done, transfer to a hot dish and cover closely. Add to the gravy a little hot water thickened with arrow-root, rice, or wheat flour,—wet, of course, first with cold water,—a great spoonful of light tomato sauce, and the juice of a lemon. Boil up and serve in a sauce-boat, or you can serve with cream sauce, made as for boiled salmon. Garnish handsomely with alternate sprigs of parsley and the bleached tops of celery.

WHITEFISH, *To Cook.* Same as mackerel.

To Bake. Soak them all night in a pail of cold water. If not fresh enough in the morning, then slightly scald them till fresh enough; then lay them on a plate, well buttered, and put them into the oven till the butter melts, after which they are ready for use.

Most other kinds of fish may be prepared in the manner of those most nearly like them in the above list.

CHOWDER. See page 240.

Fish as Food. Fish affords comparatively little nourishment, and its fat is more insoluble and indigestible than that of any other animal, and turns rancid with peculiar readiness. Acid sauces and pickles, because they are calculated to resist putrefaction, render fish more wholesome and digestible; while butter has a tendency to increase its indigestible character. Spice and salt aid the stomach to digest fish by stimulating the fibers of the stomach. Fish when dried in the open air and afterwards boiled soft, is quickly digested; but salt and smoked fish are hard of digestion, and afford but little nutrition. Fish with flesh of a tender kind are less indigestible than those which are more solid and tough, and some of the former have very little to be said against them as food.

Fistula (fis' tu-la), a non-healing, abnormal opening into the soft parts, with a constant discharge; a deep, narrow, chronic abscess. Requires the treatment of a skilled physician or surgeon.

Fixtures. All machinery and buildings that are attached to the ground by brick walls, or by sills imbedded in the ground, are fixtures, and pass by deed or mortgage with the land. But such things are largely governed by the intention of the parties at the time. Many things that would ordinarily be considered personal property may, by the intention of the parties, become a part of the real estate. Rails in a fence, or laid along the line for a fence, are part of the real estate and pass with the land. See Deed, page 301.

Flagon, a vessel with a narrow mouth, used for holding and conveying liquors.

Flail is a hand implement for threshing grain. It is both simple and ancient. It is the only threshing implement in use over a large portion of continental Europe; and though now very generally superseded by threshing-machines, it continues to be in use for general purposes on multitudes of small farms, and for particular purposes, such as the threshing out of garden crops, of small seed crops, and of specimens or samples of the grain crops, even on large farms. It consists of a handstaff, or light ashen rod, of about five feet in length, a beater or rod of ash, thorn, or other hard wood, of from 30 to 36 inches in length and one and a quarter or one and a half inches in diameter; and such a mutual attachment of the handstaff and the beater as will allow the latter free play, both in striking the grain and in gyrating around the head of the thresher. The method of using the flail is so well known as not to require description.

Flange, a projection from the end of a pipe or other mechanism so as to be screwed to another part; a term also applied to the projection of a car-wheel to keep it from running off the rail.

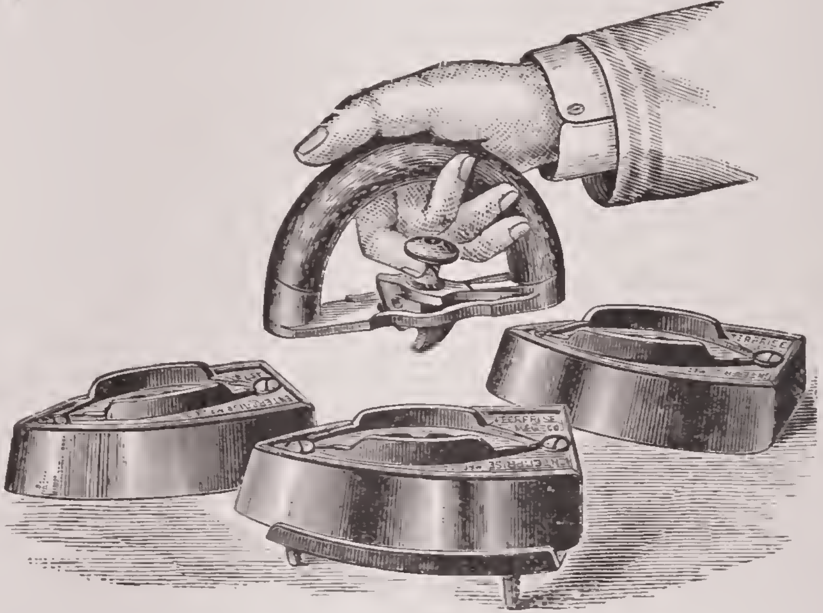
Flank. The part of a quadruped's body which extends from the ribs to the haunches. When the flank of a horse is abnormally large, it is accompanied by weakness in the loins and to great length in the back; and when it is hollow, it indicates comparative shortness in the transverse process of the lumbar vertebræ, and consequent insufficiency of space for the due attachment of the large muscles of the loins. Either fever or a diseased state of the lungs is indicated by a comparatively rapid rising and falling of the flank in respiration.

Flannel, a soft, nappy, woolen cloth, of loose texture. See Woolen Fabrics, Dyeing, Stains, etc.; as under-clothing, see Hygiene.

Flap-Jack, a sort of broad pan-cake; also, an apple puff.

Flat-Irons. To remove starch or rust from flat-irons, have a piece of yellow beeswax tied in a common cloth. When the iron is nearly hot enough to use, but not quite, rub it quickly with the beeswax, and then with a clean, coarse cloth. Some have salt on the cloth with which they wipe the irons. Flat-irons should always be kept in a warm place or wrapped in paper, to prevent the condensation of the vapors of the kitchen upon them and rusting.

A flat-iron is now in market which has a hollow, perforated handle, that is cooler than the ordinary handle; or, as it is detachable, it may be kept as cool as desirable. (See engraving.) Being semi-circular, it fits the hand better than the ordinary horizontal kind.



Flat-Irons.

Flavoring Extracts: see Extracts.

Flax. This is said to be one of the oldest cultivated plants of which we have any record, and its home is almost all over the globe. Latterly it is not raised so much, proportionally, as is cotton, but, on account of its utility as a material for certain kinds of clothing and fancy articles, as a source of oil for paints, etc., and of food for cattle in the form of cakes of its pressed seed, it will probably remain a staple of cultivation for ages to come. The profit of flax-raising in Ohio, in 1868, was twice as great as that of corn per acre, and one and a half times that of wheat.

The importance of the flax crop to the farmer in the Western and Northwestern States will hardly be denied by any one. Flax has been raised for many years in these States, but only the seed has been utilized hitherto; while the much more valuable fiber has been either burned, or used for thatching, or as litter, or at best, given as feed to the cattle. The reason of this regrettable waste of such a valuable material as the flax fiber, is, partly, that there has hitherto been no regular market, where it could be disposed of easily and on a large scale, there being as yet in the United States no manufactories using flax fiber to any large extent. It must further be remarked that the production of a good fiber, suitable for manufacturing purposes, requires from the outset a very different and much more careful treatment than when the object is merely to produce seed; and after being pulled, the flax plant has still to undergo various processes and manipulations to make it marketable, and these the farmers have either been unwilling or unable to go through. On the other hand the raising of flax for the seed offers the farmer such an easy and quick way of turning this produce into cash (as he has only to send it to the nearest railway depot, or to the next market town, if he has not already sold it before hand to the oil mill in his neighborhood) that he has been content with the scanty profit which the seed yielded to him.

From the agricultural reports of the different States it appears that the raising of flax-seed yields to the farmer an average net profit of from four and one-half to six dollars per acre, rarely more, whereas the production of flax fiber would yield no less than ten dollars, and may be as much as $50, according to the length and fineness of the fiber produced. As, therefore, the cultivation of flax for the fiber requires a more careful treatment and a greater outlay for seed than if his object is merely to obtain seed, the farmer is largely compensated by the result of the former crop.

It is evident that the future development and prosperity of the flax and linen industry in the United States is entirely in the hands of the farmers, and that, unless they energetically apply themselves to the production of a first-class fiber, according to the best methods employed in the Old World, the above industry will never take root in the United States for want of raw material, as the following example will show: In a Western county having annually about 20,000 acres under flax, with an adjacent county having annually about 30,000 acres under flax, an Eastern firm some time ago, at great expense, erected a flax mill. They were compelled, however to close, as they state, "in despair for want of proper culture, because the farmers will not raise flax straw for fiber, will neither pull it, keeping the straw straight, nor treat it as it deserves. They seem to be satisfied with raising flax for seed alone."

The following quantities of clean flax fiber were produced in 1880 respectively in the countries named, with the acreage devoted to flax.

	ACRES.	TONS.
Austria	218,042	45,162
Belgium	140,901	29,580
France	162,009	36,969
Germany	329,362	57,432
Ireland	157,534	24,508
Italy	200,350	22,953
Russia	2,000000	250,000

Referring in particular to Russia, it may be remarked that the breadth of land under flax in that country alone is little less than four-sevenths of the entire acreage devoted to the production of the fiber, and it alone produces practically one-half of the total produce of the world. A large proportion of this quantity is raised in the governments of Archangel, Wiasma and others, under the 65th degree of north latitude, where the summer lasts little more than two months, and the mean temperature in winter is about 25° below zero. Agriculturists in those remote countries have to contend with difficulties and hardships of which the American farmer has not the slightest conception. A comparison of the tiller of the soil in those high Northern latitudes with the Western farmers above alluded to will scarcely be in favor of the latter.

Now, as the area under flax in the United States is more than one million acres, it is surely no exaggeration to say that the loss to the farming community through the neglect of this branch of agriculture, is no lass than $25,000,000 per annum. It is to be hoped that these facts will open the eyes of our farmers, and that many of them will in future leave the old beaten track of raising flax for seed alone, and by doing so, lay the foundation for the future creation and development of the flax and linen industry in this country.

CULTURE. The proper soil for flax is a good alluvial or vegetable loam about midway between a loose sand and tenacious clay, and well-drained. In a very rich soil the fiber grows too close, and on a hard soil the crop will not do well. The soil should be new to it, as it is a very exhausting crop. A rich sod which has been long pastured, well plowed and rotted is about the best model of ground for flax. A good wheat soil is also generally a good flax soil. Salt, ashes, and gypsum are proper fertilizers for this plant. The last mentioned has the greatest effect if applied after the plant is up, and while covered with dew or moisture. Plow deeply in the fall, roll well, and in the spring, in corn-planting time, pulverize to the depth of three or four inches, when it is ready for the seed.

The heaviest seed is best for sowing. It should be of a bright brownish cast and oily to the touch. The inside should be of a yellowish green tint, and taste sweet and oily. Obtain it of a reliable dealer, run it twice through a fanning-mill with a brisk blast, and sift it through a fine wire sieve. Seed may be tested by placing say 50 between a couple of sods, placed earth-sides together, and laying up in the kitchen where the seeds will keep warm. Moisten the seeds once or twice, and in two or three days the good seed will have germinated. Count these and you will know the proportion of good seed to the whole lot. Before sowing, soak the seed two or three hours in water and roll it in land-plaster (gypsum). With a log chain mark the field into squares 18 feet each way, a breadth wide enough to sow at one round or two casts. If you are growing for the seed only, or for seed and coarse tow, sow about three pecks to the acre; if for fiber only, about one and one-half bushels. In the former instance, the plant will branch generously, producing much seed; in the latter case it will have few branches, which, with the seed, will be near the top, leaving the fibers long and unbroken by branches. Count the lands you have marked off, and calculate the amount of seed required for each land, each way. Begin at a corner; take as much seed as you can handily hold between the thumb and three fingers, and scatter as evenly as possible. Some sowers go directly back and forth upon the same land;

others take a number of lands and walk around them as in plowing. The main thing is to scatter the seed evenly.

Covering flax should never be done with a team, but with a brush-harrow drawn by man or boy. Such a harrow may be made at a trifling expense of time and labor. It saves in many capacities, and if put in a dry place after use, will last several years. Take a five-foot piece of two to four-inch scantling; bore holes and insert a pair of shafts, with a cross-bar, as in a hand-cart. Then bore two rows of three-quarter-inch holes, alternating the holes. Into these place the butts of brush cut about two feet long, fastening them with nails. Similar brush may also be nailed along the sides of the scantling. To make it heavier, if necessary, tie blocks of wood upon the top. With such an implement, a man may cover four or five acres a day, and do it well. Flax-seed needs but about half an inch of covering, but that should be fine soil. It should be covered evenly, or it will ripen unevenly and cause loss and trouble. The Riga and Dutch are the two principal varieties grown in this country. The former is adapted to more soils than the latter, and yields the heavier crop, though the Dutch has a finer fiber.

When the flax has grown three or four inches high, it may be carefully weeded by hand; and for this it is best to employ children, as they are not so heavy as to press down the soil and harden it. Adults employed to weed flax should go barefoot at the work, so that what plants are trodden down may be able to rise again.

Harvesting, etc. Flax should be pulled or cut when the bolls are brown in color, the stems a light yellowish hue, and the leaves also of the same color about one-fourth the way up. If pulled when green there is much loss in quantity and quality, though it is best to be harvested when flowering if the fiber is wanted for cambrics and the finest linen. If left until dead ripe the seed will be excellent but the fiber will not be strong, soft or heavy. For dew-rotting it need not be pulled until nearly ripe. If, however, the crop falls or "lodges" before ripening, it should be pulled at once, whatever be its stage of growth, as that is the only means of saving it at all. In pulling, grasp a handful just below the top, jerk quickly, shake the dirt of the roots by rapping them on the ground, and either lay in swaths or bind into four-inch "gavels" (little shocks), with strips of bass-wood bark or stems of flax. Keep the dirt ends perfectly even. If left in the swaths, allow it to dry, and bind it in the morning when the dew is on. The gavels are subsequently gathered into ricks or windrows running north and south, to receive sunlight upon each side, the ricks to be made of 18 or 20 gavels set two and two. Before stacking or stowing away in the mow, flax should be as dry as hay should be.

Cradles, scythes, and machines are used for cutting flax, but the work is not so satisfactory as hand-pulling. Machines for pulling have also been invented, with doubtful results.

To stack flax, lay three timbers parallel with each other upon the ground, from two to three feet apart, as the flax is long or short, and lay the bundles upon these, heads upon heads and roots toward roots, alternating. Cover the stack with boards or clean straw, so that it will be kept dry. If the flax is to be stored in a mow, see that all hay seed and litter is first swept out. The assorting of flax in regard to its length is most easily attended to when it is pulled. That which is tangled should be kept separate.

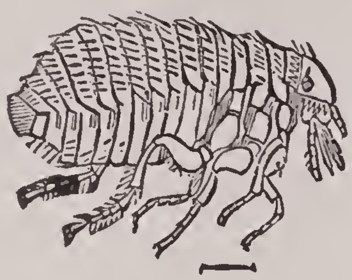
Threshing. This is done in October, either by whipping the flax by handfuls over a stone or an upturned plow, by flails, by a machine, or by drawing the heads through a comb or rake of finely-set teeth. Flails, however, somewhat injure the fiber. Tangled flax is, of course, threshed out by the rougher and more rapid methods.

Rotting. This is best done by the manufacturer, as follows: For dew-rotting, spread the flax, in October, evenly upon a smooth, clean grass-plat, in swaths about half an inch thick, keeping the butts even; after lying a week or ten days, according as the weather is wet or dry, turn the swaths over by a long pole. In three to six weeks it will be sufficiently rotted for breaking. For water-rotting, or steeping (which is a better method), simply keep the flax under water, not in contact with the ground, until the mucilage in the stalk is thoroughly dissolved, which will be in five to seven days if the weather be warm, longer if the weather is colder. Sink a platform with stone, place the bundles upon it and fasten them down with slats over them nailed to stakes driven into the ground. In both the above processes the degree of rotting can be ascertained from time to time by breaking a few stems. After rotting it is dried and stored away until it is broken.

Breaking, etc. The old-fashioned hand flax-break is still in extensive use, though machines are taking its place. The "shives" (the woody stem, as broken) are next "scotched" out by a hard-wood, double-edged knife, two feet long, called a "swingle," striking it over the flax as the latter is held on the end of a board. The fiber is next drawn through a "hatchel" to straighten and smooth it, and clean what shives there may be remaining.

Flax straw makes excellent packing for ice. But a comparatively small amount of it is required. It is clean, easy to handle, and not as liable to mold or rot as the substances that are usually employed. A piece of ice taken from the house and wrapped in flax straw may be carried a long distance with but very little waste. Many farmers do not put up ice because it is difficult to obtain saw-dust or tan-bark for packing. Flax straw makes excellent bedding for all kinds of stock, and it is especially good for hogs. It is excellent material for mulching, and there are very few things superior to it for mulching strawberry vines. It forms a close sort of matting on which the berries can ripen without being spattered with mud. Most stock will eat flax straw after they have become accustomed to its use by having small quantities fed at a time.

Flea, a well-known, nimble, annoying, parasitical insect. Its habits and general appearance do not require description, further than is given by the accompanying illustration. Its suckers are complex and thoroughly adapted to its blood-drinking nature. A sharp, razor-like apparatus, with its blade working on a kind of handle, exists on each side of a slender, bristle-like tongue. Fleas are especially parasitical on dogs, and often cause them great torment, and render them obnoxious and disgusting to human beings. To remove fleas and lice on dogs, mix soft soap with as much carbonate of soda as will make it into a thick paste. Then rub this well into the roots of the hair all over the dog's body, adding a little hot water as you go along, so as to enable you to completely saturate the skin with it. Let it remain on for half an hour, then put the dog into a tub with warm water for ten minutes, letting him quietly soak, and now and then ducking his head under. Lastly, wash the soap completely out, and let him dry by exercise in the sun, choosing a warm day for the operation. This, after two or three repetitions, will completely cleanse the foulest skin. To prevent vermin from again accumulating, moisten the hairs once a week with a teaspoonful of carbolic acid to half a pint of water. Keep his house or resting place and bedding clean and sweet, and sprinkle it occasionally with the last mentioned solution. The oil of pennyroyal will certainly drive them off; but a cheaper method, where the herb flourishes, is to dip dogs and cats into a decoction of it once a week. Mow the herb and scatter it in the bed of pigs once a month. When the herb cannot be got the oil can be procured. In this case saturate strings with it and tie them around the necks of dogs and cats, pour a little on the back and about the ears of hogs, which you can do while they are feeding, without touching them. By repeating these applications every 12 or 15 days the fleas will leave the animals. Strings saturated with the oil of pennyroyal, and tied around the necks and tails of horses will drive off lice; the strings should be saturated once a day. A wash containing from six to ten per cent. of petroleum, naphtha or benzine will drive fleas from animals; a weak solution of carbolic acid would be efficacious. All mats or straw on which dogs, cats, hogs or other animals sleep about the house, kennels, or sties, should be frequently renovated or burned. Cleanliness is important. In the beds of the house, a sprinkling of chamomile flowers is recommended, or the placing of new flannel between the sheets.



Flea Magnified.

Flecks in Cream. Flecks are generally supposed to be pieces of dried cream, and possibly sometimes they may be, but usually they are not, for occasionally they exist in milk before any cream rises, and sometimes are mingled with butter made by processes of cold-setting in which the cream remains soft, no part of it being dried at all. They seldom appear, however, in butter made by cold-setting; they are mostly found in butter made in dairies where the milk is set without any other cooling than that of the air in the room where the milk stands. For the most part they are developed in milk after it comes from the cow. By quickly cooling milk to a low degree, change is so much arrested that they cannot develop. They can only form within certain limits of temperature, and when they do, are likely to appear as plentifully in the milk as in the cream, and often more so, which is evidence adverse to their being originated from dried cream. In milk which is in a perfectly normal condition they never appear. They always occur in milk which is more or less faulty. They are very apt to accompany an inflamed state of the udder, and seldom or never appear without it.

When milk in which flecks are liable to occur is set where the sun will shine directly on it, or even where much reflected light falls upon it, they form much faster than when light is pretty much excluded, and form on or near the surface, and much more plentifully in the cream than in the milk. A current of air over the milk also favors their development, and a damp air more than a dry one.

Flecks, or "white caps," whichever they are called, are apt to be more common in the fall and winter, when cows are drying up, and in hot and dry weather in the summer, when they are affected by heat and drouth. At such times their udders are apt to get inflamed, and this appears to be the cause, or at least a stimulating cause, of their origin.

There are different ways for disposing of flecks. The first and best way is to keep cows so healthy and well supplied with food and drink that they will not form in their milk. Some attempt to dispose of flecks by mashing them and crowding them through a strainer made of wire-gauze with fine meshes. By forcing them through the gauze by rubbing with a smooth wooden roller around the sides of the conical strainer, the flecks are broken to pieces and disappear by being pulverized. They never churn, however, whether fine or coarse, any more than curd would, and the finer they are the more likely they are to get caught in the butter and affect its keeping. Such butter ought not to be packed with that which is sound, for it is always a little imperfect. If one has milk in which flecks are liable to form, their development can be prevented, as already stated, by either high heating or low cooling while new; and if, by unforeseen occurrences, they form and appear in the cream, they can be kept out of the butter when churning by gathering it in the granular form.

Fleece, the woolly coat shorn from the body of the sheep. A primitive and barbarous method of obtaining the fleece was to force a flock through a narrow and rough passage, in order that by rubbing against one another and the asperities of the passage, they might denude themselves of their wool; and a later and exceedingly cruel method, which continued till not very long ago to be practiced in Orkney, was to catch the animals and forcibly tear off their wool. The mild and economical method now practiced, together with the proper rules for observing it, will be noticed in the article Sheep.

A fleece, immediately after being shorn from the animal, ought to be spread unbroken on a board, carefully examined, thoroughly cleaned of all adhering substances and filthy locks, rendered completely pure and neat, and then folded to a breadth of two or two and one-half feet, rolled up from the tail to the neck, and tied up in such a manner as to form a neat, compact bundle. Its shorn surface ought to be outside; and this, in consequence of the secretion technically called yolk, exhibits a silvery and lustrous appearance. The fleeces obtained at any one shearing ought to be carefully assorted according to their different qualities; for even though the whole flock be of one breed, and as nearly as possible homogeneous, the fleeces, in every case, possess considerable varieties of character. Some differ from the others in color; some have their wool matted and almost felted like cloth; and some may have suffered deterioration and loss by the partial shedding of their wool. The fleeces of the two sexes, and the fleeces of either sex of different ages, also widely vary. See Wool.

Flies. A fly is a two-winged insect. The word, in popular usage, is sometimes so restricted as to designate only a few species, or at most a limited portion of the dipterous order, and sometimes so extended as to include some winged insects of other orders, but it best comports with definiteness of idea, and at the same time is not much twisted out of any of its ordinary applications, when used as strictly synonymous with the scientific name, diptera.

The wings of flies, or dipterous insects, are two in number, and consist of veined and transparent membranes, and are attached to the middle of the sides of the thorax, and, for the most part, possess, near the point of their intersection, a pair of short clubbed organs called halters or balances. The body consists of head, thorax and abdomen. The mouth has a sucker of from two to six lancet-like scales, enclosed in a kind of sheath. The antennæ exceedingly vary in several of their characters, but especially in their length. The eyes are lateral, but in some instances they meet on the summit; and in others they are so large as to occupy nearly the whole head. The legs, in most species, are long and slender, but in some are thick and spiny, and in others are exceedingly long. The larvæ of flies have a fleshy head and a simple structure, and in general are so like one another that those of different species, or even of different genera, are quite undistinguishable from one another by unpractised observers. Most of the larvæ pass into the pupa state without shedding the skin, or simply by a gradual transmutation of it into a cocoon; and some shed the skin and become inert-looking and cocoonless pupæ; but two entire families of flies, the Hippoboscidæ and the Nycteribudæ, possess the extraordinary constitutional habit of producing their young in the condition of pupæ, or of affecting the transformations from ovules to larvæ, and from larvæ to pupæ within the body of the parent.

Flies, as to both their numbers and their habits, act a powerful part in the economy of the animal creation, and not in a few instances of great moment, challenge the attention of almost all observers, but particularly of cultivators of the soil. In their perfect state they are scarcely less numerous, in point of species, than any other order of insects; but if we look at them with respect to the number of individuals, we find them infinitely to exceed any other.

The clouds of midges, for instance, rising at eventide over the marshes, like the incense of the temple, equally pay homage to the Divinity in showing forth his mighty power; whilst myriads of flies of every kind are to be found in every quarter of the globe, traversing plants and every minute object, and more particularly all that has ceased to live. This immense profusion with which they are dispersed over the globe, causes them to fill two very important functions in the economy of nature; first, they serve for food to a vast number of the higher animals; charged with a divine mission by Him "who giveth food to the young bird," the swallow and the sparrow destroy them by myriads, and the fly-catcher and the humming-bird alike find in them a constant shedding of manna; whilst, in the second place, they cease not in effecting the disappearance of all substances in a state of decomposition, both animal and vegetable; they are universal scavengers; and so great is their activity, and the rapid succession of their generations, that Linnæus might well say that three flies can consume a horse as fast as a lion. Amongst such vast numbers of objects, it is not surprising that some should be found obnoxious to ourselves or our properties. Many species, accordingly, cease not to make man their prey, by sucking his blood, whilst some attack our cattle, in like manner, or deposit their eggs upon their bodies, within which the parasitic larvæ feed; others deposit their eggs, or young, upon our growing corn, and upon our prepared food of various kinds. Many species reside in woods, meadows and marshes; others move with dancing feet upon the spray of the waves and even upon the snows of the polar regions. Many are attached to plants, upon the flowers of which they abound, sucking the honeyed sweets, without giving the preference to any particular plant, whilst some are confined to a single species of flower, but it is upon the star-like Anthemis of our meadows that the majority seem to revel with the greatest delight. During the summer and autumn, the flies are attracted to our orchards, in order to destroy our fruits, whilst some species delight in the honey-dew of the aphides, or the fluids which escape from the wounds of trees. The domestic fly feeds alike upon all kinds of household provisions.

To Destroy or Drive Flies Away. The best general method of keeping flies out of a house is cleanliness, keeping the rooms open, breezy, and light, and abstinence from the preparation and use of sweet things and meats, gravies, etc. During a warm rain the house should be kept closed, while the family can remain on the porch. Good fly-traps are in market everywhere, but all that can be trapped is but a small portion of the whole number about the premises. As the saying is, "by killing one lot you only make room for the next, which is just outside ready to come in."

To Kill Flies. Beat up the yolk of an egg with a table-spoonful each of molasses and black pepper finely ground; set it about in shallow plates, and the flies will be rapidly killed. A sweetened infusion of quassia will answer the same purpose. Dissolve one drachm extract of quassia in a gill of water, mix with one-half gill of molasses, and pour the mixture on a flat dish where the flies have access. The quassia acts on them like a narcotic.

To Drive Flies from Stables. Scatter chloride of lime on a board in a stable, to remove all kinds of flies, but more especially biting flies. Sprinkling beds of vegetables with even a weak solution, effectually preserves them from caterpillars, slugs, etc. A paste of one part powdered chloride of lime and one-half part of some fatty matter placed in a narrow band round the trunk of the tree, prevents insects from creeping up it. Even rats, mice, cockroaches, and crickets flee from it.

To Keep Flies from Horses. Procure a bunch of smart-weed, and bruise it to cause the juice to exude. Rub the animal thoroughly with the bunch of bruised weed, especially on the legs, neck, and ears. Neither flies nor insects will trouble him for 24 hours, when the process should be repeated. A very convenient way of using it, is to make a strong infusion by boiling in water. When cold it can be conveniently applied with a sponge or brush. Smart-weed is found growing in every section of the country, usually on wet ground near highways.

To Prevent Flies from Injuring Looking-Glasses, Picture Frames, etc. Boil three or four onions in a pint of water; then with a gilding brush go over your glasses and frames, and the flies will not alight on the article so washed. This may be used without apprehension, as it will not do the least injury to the frames.

Float, to make. Take a quart of new milk, sweeten and flavor to suit your taste, put it on the fire, let it get hot, almost boiling; now add the yolks of six eggs well beaten, and stir it until it becomes thick; do not let it stand a moment without stirring; as soon as it is thick pour it in a dish or jar and stir it until there is no danger of its turning to custard. Now beat the white of the eggs to a stiff froth, and cut it in slices and lay it on hot water to cook, turning it over so both sides will be cooked. When all is done pour your float in a dish, and lay the white on top.

Float Board, one of the boards forming the exterior of a water-wheel, against which the stream of water dashes.

Flock, any number of sheep or other domesticated gregarious animals which feed together or are under the care of one person. We say a flock of sheep, a herd of swine, a drove of cattle, a pack of wolves, or hounds.

Floors. Floors should not often be wetted, but very thoroughly when done. Uncarpeted floors should once a week be dry-rubbed with hot sand and a heavy brush, the right way of the boards. To give floors a beautiful appearance, after washing them very nicely with soda and warm water, and a brush, wash them with a sponge and clean water, rubbing lengthwise the boards. Then dry with clean cloth, rubbing hard.

To extract oil spots from floors, make a strong lye from pearlash and soft water, and add as much unslacked lime as it will take up. Stir together and let settle; bottle it and stop close; have ready some water to dilute it when used, and scour the part with it. If the liquor lie long on the boards it will draw the color out of them; therefore do it with expedition.

A wax for polishing floors can be made by taking 12½ pounds of yellow wax, rasped, and stirred into a hot solution of six pounds of good pearlash, in rain-water. Keep it well stirred while boiling, and when the froth goes down, stop the heat, and add to the mixture, while still stirring, six pounds of dry yellow ochre. It may then be poured in tin cans or boxes; it hardens on cooling. When wanted for use, dissolve a pound in boiling-hot water, stir the mixture well, and apply to the floor with a paint brush, while the fluid is yet hot. It will dry in two hours, after which polish the floor with a large floor-brush, and wipe with a woolen cloth. A coat of this preparation will last six months.

A Home-Made Cloth for a floor can be made as follows: First, paper the floor of your bed-room with brown paper or newspapers. Then over these put down the wall paper, which has been selected for its carpet-like appearance. A good way to do this will be to put a good coat of paste, the width of the roll of paper and the length of the room, and then lay down, unrolling and smoothing at the same time. When the floor is all covered, then size and varnish; only glue and common dark varnish need be used, and the floor will look all the better for the darkening these will give it. When it is dry put down a few rugs by the bedside and before the toilet table, and you have as pretty a floor cloth as you could wish, and at a trifling expense—a floor cloth, too, that will last for years, if not exposed to constant wear.

If you have a painted floor, keep soap and soapsuds off of it, for it spoils the brightness of the paint, makes it soft, and then it peels off, leaving the floor looking worse than if it had not been painted. If your floor has not been painted, keep soap off of it, for it gives a dirty, grimy look, and keeps growing worse all the time. Just take clean, hot water, put a teaspoonful of spirits of ammonia into a three-gallon pail of water, stir it, and with a clean, long-handled mop, rub the floor all over, then wipe it off with clean water. It will take a little while to get the gray out of the boards, but it will come out after a time, and you will find it far easier to keep your floor white and nice than it was when cleaned with soap or suds.

When a carpet is taken up to be cleaned the floor beneath it is generally very much covered with dust. This dust is very fine and dry, and poisonous to the lungs. Before removing it sprinkle the floor with very dilute carbolic acid, to kill any poisonous germs that may be present, and to thoroughly disinfect the the floor and render it sweet.

See also Broom, Sweeping and Carpet.

Floriculture, the art of cultivating flowers and ornamental plants with a special view to the finest forms, the most beautiful tints, and their improvement. As the country becomes older and more wealthy, more and more attention is paid to ornamental gardening, to beautifying the homestead, to the decoration of the house, the public park, the churches, public buildings, etc. Floriculture has taken rapid strides in the past ten years. The florists of Europe and the United States have devoted themselves to their trade with praiseworthy emulation; each country has striven with the other—Germans, French, English and Americans have all been engaged in the strife, and to-day we profit by their exertions. Our old-time garden flowers are utterly eclipsed by the floral belles of the season. Compare the asters, balsams, stocks, pinks, Petunias, which amateur florists now cultivate, with those raised 25 years ago, and the great improvement in each and all is seen at a glance.

Flower gardening can only be commended in its results. Modern art has compassed the globe, and brought to our homes the floral treasures of ancient Asia and the isles of the sea. But flower culture, attractive as it is to the more refined taste of woman, and all who sympathize with her, commends itself to us as one of the most instructive and refining of pursuits. It has, too, its market value, though that seems little thought of; and the increasing demand for flowers by those who can not or will not grow them, will give an added interest to the occupation. Landscape gardening may be said to include the whole, of which ornamental trees and flower culture are parts. Here we bring under consideration the configuration of the surface; the surrounding landscape; the effects of grouping and massing trees, shrubs, and flowers of different colors and shades of color; the massing of single colors.

For flower gardening it is as necessary to select proper soil and location as it is for vegetable gardening. The strong, clayey, putty-like soil characteristic of the Northwest is well adapted to a majority of ornamental plants; a deep sandy loam is better, and it is also better for nearly all plants to be set in a soil which has good under drainage. It is better, in the first place, to select a good location than to turn a poor one into a good one by hauling soil, etc., upon it. In a general way, the natural habits of the plant should be imitated in culture; but this does not mean that the plant should be crowded by other plants, or set in bad ground and neglected as we generally find wild plants. The hints to be heeded are those given by the wild plant where and when it attains its greatest degree of perfection.

The ground should slope gently to the south or southeast; and if protected in the opposite direction by hills or timber, so much the better. If not protected naturally, a spruce hedge on the north and west sides is very desirable. If there is not a sandy or gravelly sub-soil, it is necessary to resort to tile drainage,—even more thoroughly than for other purposes. When one is not able to obtain tiling, he can very easily make a board drain that will last for years. Lay a narrow board flat in the bottom of a ditch, and place two wider boards over it, the upper edges meeting and supporting each other, forming a triangular drain. Some kinds of wood will be serviceable in this way for 20 years. The preparation of the ground, of course, is similar to that for vegetable gardening or ordinary field culture. Never work in the ground when it is wet enough to stick or clog, as that makes mortar of it, which dries into hard lumps and sticks.

For the manner of laying out walks, see Landscape Gardening. For Manure and Fertilizers, look under these respective heads. As to special manures and fertilizers for particular plants, there are no such things requiring attention. Plants, like man, need a general and natural combination of all the foods. For Lawn culture, see that heading also, in its alphabetical place.

The subject of flower-beds we must consider here. The old-fashioned mixed borders four to six feet wide along the walks of the fruit or vegetable garden, were usually planted with hardy, herbaceous plants, the tall growing at the back, with the lower-growing sorts in front. These, when there was a good collection, gave a bloom of varied color throughout the season. But the more modern style of flower borders has quite displaced such collections, and they are now but little seen except in very old gardens or in botanical collections. Then, again, we have mixed borders of bedding plants, a heterogeneous grouping of all kinds of tropical plants, still holding to the plan of either placing the highest at the back of the border if it has only one walk, or if a bed has a walk on each side, the highest in the middle, and the plants sloping down to the walk on each side. The mixed system still has its advocates, who deprecate the modern plan of massing in color as being too formal, and too unnatural a way of disposing of flowers. But be that as it may, we will not stop to argue the matter further than to state that the "carpet" styles of massing plants are more interesting than any mixed border. Nearly all the public parks in and about London are so planted, and thousands of cottage gardens vie with other in imitation of the parks. But to plant in patterns or in ribbon lines requires for immediate effect a large number of plants, for the reason that they must be so stout that they will meet to form continuous masses shortly after planting. A study of figured carpets, therefore, or of kaleidoscopic views, will best convey to any amateur a general idea of the modern conception of beauty in the laying out of flower beds. In a circular bed, where it is desired to have the taller plants toward the middle, and where there should be planting in masses or ribbon lines, the following lists of plants will be good, the first mentioned being the taller:

LIST NO. 1.

		Height in Feet.
1.	Canna Indica zebrina, leaves green and brown striped.	6
2.	Salvia splendens, flowers scarlet.	5
3.	Golden Coleus, leaves orange and brown.	4
4.	Achyranthes Lindeni, leaves rich crimson.	3
5.	Phalaris arundinacea var., leaves white and green.	2½
6.	Achyranthes Gilsoni, leaves carmine.	2
7.	Bronze geranium, leaves golden bronze.	1½
8.	Centaurea candida, leaves white.	1
9.	Alternanthera latifolia, leaves crimsion and yellow	¾
10.	Lobelia Paxtoni, flowers blue.	½

LIST NO. 2.

1	Caladium esculentum, leaves large green.	5
2.	Japanese maize, leaves striped white and yellow.	5
3.	Coleus Verschaffeltii, leaves chocolate crimson.	4
4.	Delphinium bicolor, flowers blue and white.	3
5.	Cyperus alternifolius var., leaves white and green.	2½
6.	Achyranthes Verschaffeltii, leaves crimson.	2
7.	Mountain-of-snow geranium, leaves white and green.	1½
8.	Tropaeolum, Ball of Fire, flowers flame color.	1
9.	Echeveria metallica, leaves gray, with metallic luster.	¾
10.	Alternanthera amoena, yellow and carmine.	½

Of course the above classes can be transposed in any way to suit beds of all widths, keeping in view that where small beds are placed near walks the lower growing kinds are more suitable, while the taller kinds are placed farther back. Very fine effects are produced by planting on a lawn a single specimen of stately habit, such as a castor oil bean, Datura, Caladium, Hibiscus, etc., which grow five or ten feet high in a single season, and are particularly of a striking appearance; or, instead of this, a mass of six, eight, or 12 plants of scarlet sage, which will form a group six feet high and wide; its dazzling scarlet color, contrasting against the green of the lawn, is superb. Many of the amaranths are also well suited for planting in single groups. Amarantus tricolor gigantea, or Joseph's coat, grows six feet high and is the most brilliantly colored of all plants in foliage, scarlet, crimson and golden yellow predominating. The amarantus bicolor ruber grows five feet high and is plumed with scarlet crimson. In contrast to these, plants of a more somber tint may be used, such as Pampas grass, Ravenna grass, or the Tanyah, or Caladium.

Seedling plants can be nearly as well raised in the window as in a greenhouse, provided the temperature is right; for seeds do not need a strong, direct light while germinating. Indeed, a strong, constant light is a disadvantage, as it dries the earth too fast, necessitating frequent watering, which bakes the surface. The best things in which to sow seeds are shallow boxes, only two or three inches deep, with open seams at the bottom through which water will drain quickly. Fill the boxes within half an inch of the top with light, rich earth; nothing is better than black leaf-mold from the woods, or light sandy soil mixed with an equal bulk of stable manure so rotted as to resemble leaf mold; it will not answer unless rotted as fine as dust. Sweepings from a paved street are excellent mixed with light sandy soil, the object in all cases being lightness of the soil or mold, as the germs of many seeds are too tender to push their way up through a stiff soil. When the proper soil is put into its place, pat it down with a smooth board, sow the seed carefully and evenly over the surface, and then, with a common sieve, sift just as much earth evenly over the seed as will cover it and no more; moisten this covering with the finest possible spray, so that it will not settle and bake in the least. Keep the box at a temperature as near 60° as possible, taking care to give it a shower or spray only when the surface appears to be dry. As soon as the plant is up, a minute fungus will generally attack it, which, if not successfully combated, may sweep off the whole crop in 48 hours. As soon, therefore, as there seems to be any foreign growth upon the little plants, give it a slight drenching of tobacco water, or of water saturated with sulphur and quicklime. As soon as there are indications of any check in the growth of these tiny seedlings, they must be carefully taken up and planted out in similar boxes, prepared exactly as the seed boxes have been; they may be planted quite closely, not more than half an inch apart; then let their further treatment be precisely the same as in germinating the seeds. In the course of a few weeks they will have grown freely, and they may then be lifted and placed in similar boxes, but further apart, say 3 or 4 inches, or potted singly in 2½ or 3-inch pots, as most convenient, until they are ready to be planted out in the open ground or elsewhere. In this way as great a number of plants may be raised from a 25 or 50 cent packet of seed as would cost $25 or $50 to purchase, besides the far greater satisfaction of their being the product of your own hands.

Some plants, as geraniums, roses, Azaleas, Camellias, etc., are best propagated by cuttings. As a general rule, the lowest point at which a twig or clod of an herbaceous plant will break instead of bend, is the best place to cut off the cion for planting; but with woody-stemmed plants there is no general rule. The rose, for example, is in the best condition for cutting when the flower bud is about the size of a large pea. Although the shoot on which the flower bed shows will make a good cutting, yet if it is desired not to waste the flower, cuttings should be made of the "blind" shoots, that is, such young shoots as do not flower. It is not necessary to cut at a joint, although most gardeners still do so.

What is called the "mud" or "saucer" system of propagation is very valuable, and is as follows: Take any common saucer or plate with an inch or two of sand in it, and put into this the cuttings near enough to touch each other; water this until the sand is in the condition of mud; place in a sunny window, greenhouse or hot bed; keep the sand constantly as wet as mud. Be careful to apply the water gently so as not to remove the plants; keep the temperature between 65° and 100°; with this system the plants will bear a higher temperature, as so much water is used; a temperature of 75° or 80° in the sunlight is about the best. The cuttings will root in 6 to 20 days; verbenas, heliotropes, fuchsias, etc., root in a week, while roses, carnations or Azaleas take 3 or 4 weeks. When rooted they should be potted in light soil, such as described above for propagating by seeds, in pots two or three inches in diameter, and treated carefully by shading and watering two or three days.

Layering, Grafting and Budding flowering plants are done precisely as with fruit plants. See those headings in their alphabetical order in this work.

Every class of plants requires some peculiarities in their propagation and culture, and a full detail of these would fill a very large volume; here we can only give those general directions which will enable one to manage most plants successfully; and now a few words in regard to tropical bulbs, seeds, etc. The tuberose in most Northern States must be artificially forwarded to bloom in perfection in the open air. To do this, place the dry bulbs in soil in pots or boxes about the first of May, keeping them rather dry until they start to grow freely, and more water may be given; the first week in June transplant these bulbs to the open border. While being forwarded the bulbs may be kept in any place where the thermometer ranges from 65° to 75° at night; at this time light is not necessary; nor is a greenhouse essential for the purpose, as a hot-bed or even a warm sitting-room will do nearly as well. Caladium bulbs should be treated in the same way, started in small pots and shifted into larger ones as soon as these get filled with roots; if properly treated they will be large enough by late summer or early fall to require a flower pot a foot wide, and the plant should be, according to variety, two to three feet in diameter across the leaves. They require a partial shade. The same general treatment is also best for Begonias, Bouvardias, Cissus, Coleuses, Dracænas, Euphorbias, Poinsettias, and indeed all other plants known as "hothouse" or "tropical." All plants kept in windows should be turned around every day that every part may receive an equal portion of sunlight. The matter of temperature in all this cultivation is very important; unless one is able to keep the necessary high temperature, he should not undertake to raise tropical plants. Late planting, both of bulbs and seeds, is therefore advised. Even tomato, pepper and egg-plant seeds are better sown in April than in March. Amaranths, balsams, Salvias, double portulacas, Cannas, cockscombs, Zinnias, etc., should not be sown in hot-bed before April, or in the open ground before the middle of May. Of the tens of thousands of pot plants sold from the street stands in spring, probably not one in ten survives. They are forced into bloom in small pots, have no constitution, and very few ever give another flower. Plants from the warm greenhouse should be gradually inured to the cool rooms where they are to remain. Plants taken from the garden in autumn should be carefully potted early in September, hardened in the shade out doors, and removed to the parlor when the nights become frosty, and have plenty of fresh air on warm and sunny days. If taken up late, they are long in blooming. The following sorts are named as best for windows: Of roses few do well, but among these few are sanguinea, the best; agrippina and Safrano; nearly all the Abutilons; Cuphea, a constant bloomer; Cyclamen Persicum; Oxalis, all the species; Chinese primrose; most of the monthly pinks, which bloom all the last half of winter; the zonale pelargoniums; the Indian jasmine and Calla lily.

For the potting of plants the best mold is soil immediately under a turf mixed with well rotted stable manure, or street sweepings thoroughly mixed with fresh soil. For small and tender plants it should be sifted. In shifting to larger pots there is danger of taking those which are too large: they should be large enough merely to admit an inch or two more of soil around and below the plant. If old pots, they should be washed, in order that there be free evaporation through the pores. Do not water the plants immediately before transferring them to another pot: but after the fresh soil is carefully adjusted around them in their new place, water the new soil, and then the roots will make vigorous effort to extend themselves out into it. The leaves of all plants in the house should be kept clear from dust by frequent sponging. A sprinkling every day is good for them, but the soil should not be watered but once in several days, and then it should be thoroughly saturated. Most plants do better without saucers or dishes of water under and in contact with their pots. In the greenhouse it will be convenient to set the pots upon an inch or two of wet sand, from which moisture can be absorbed when the watering is neglected. Pots which contain ornamental plants in rooms, are often needlessly repulsive by the exposure of the earth in which they are planted. We have found a covering of an inch of white sand to prevent crusting the surface or soiling the edges of the pot, and at the same time allow free watering. A more ornamental appearance is effected by procuring from the woods the handsome flakes of fresh, green moss found in damp places or on rotten logs, and covering the earth in the pots neatly with one of these flakes. It serves as a mulch, keeps the earth moist and mellow, admits watering, and furnishes a neat, green carpet under the plants.

The more hardy house-plants, requiring a temperature of 45° to 55°, comprise the Azaleas, Abutilons, Ageratums, carnations, Cinerarias, Catalonian jessamines, Cape jessamines, Camellias, Callas, Chorizemas, geraniums of all kinds, Hibiscus, Hyacinths, Myrsiphyllum, Smilax, Mahernias, Primulas, Stevias, roses, violets, and the so-called greenhouse plants. Those requiring a temperature 10° higher are begonias, Bouvardias, Clerodendrons, Euphorbias, Epiphyllums, Fuchsias, heliotropes, Poinsettias, tuberoses, etc. Roses will do in either temperature. Both classes of plants require a moist atmosphere. In the common dwelling it is necessary to keep upon the stove a very wide, shallow pan of water in a constant state of evaporation.

The green fly and most other pestiferous insects can be kept away by fumigation with smoke of burning slightly moistened tobacco stems, or by syringing with a cold infusion of the same. The red spider is kept off simply by a proper temperature and degree of moisture, as they appear only when the atmosphere has been too dry or warm. This insect is so small that we can hardly see it, but the effect of its work is the abnormal brown color of the leaves. The mealy bug can be destroyed by alcohol thrown on with an "atomizer," an apparatus sold by druggists for the purpose; but as some plants can not stand any drug strong enough to kill the bug, it is safer to "sponge him off," either with a sponge or a brush. He is easily recognized in the axils of the leaves by his dusty, or white-mealy appearance.

To destroy mildew on roses in house cultivation, boil one pound each of lime and sulphur, in two gallons of water, until it is reduced to one gallon; allow the liquid to settle until clear, and bottle it for use; one gill only, and no more, of this liquid is mixed in five gallons of water, and this is thoroughly syringed over the roses in the evening. This liquid should indeed be used as a preventive. The rose slug, a light green, soft insect, varying from one-sixteenth to nearly a whole inch in length, eating out the substance of the leaves, is almost invulnerable to all attacks; a good preventive is daily syringing the plant in early spring with a solution of whale-oil soap in the proportion of one pound of the soap to eight gallons of water. The rose bug, or chafer, which is also destructive to the dahlia, aster, balsam, and many other flowers, can be himself destroyed only by picking off with the hand. An English writer says that quassia and soft soap will destroy lice on roses—used by boiling four ounces of quassia chips for half an hour in a gallon of water, and when cold and strained adding two or more gallons of water and six ounces of soft soap. With this syringe the bushes. The best remedy, however, is tobacco water, made by pouring a gallon of boiling water on four ounces of tobacco, and covering till cold. The shoots may be syringed or dipped in it. The blue aphis attacks the extremities of the roots of asters, verbenas, petunias, Centaureas, etc., and can be reached only by thoroughly saturating the ground with a very strong decoction of tobacco. When ants attack a plant they can be easily led off by a fresh bone; when the bone is covered with them take it off and destroy the insects. Brown and white scale insects, which infest oleanders, ivies, etc., have to be washed or rubbed off. Thrips (see under Grapes), does not succumb to the usual remedies so easily, but Mr. Peter Henderson says a moist atmosphere, tobacco smoke or water, and good culture generally, will keep off almost all insects. Where angle-worms make the ground too open around pot-grown plants, they can be thoroughly driven away by saturating the place with quick-lime water—one quart of lime to ten gallons of water. All kinds of worms can be driven out of pots by securely corking up the drainage holes and flooding for several hours with clear lime-water.

Whenever plants begin to drop their leaves it is certain their health has been injured by wrong culture, generally one that has been too rich or stimulating. In this case do nothing more to it until signs of reaction appear, or let the earth in which it is planted become nearly dry, take the plant from the pot, crush off the old, soured soil, and put the plant into new earth and a new pot. Be careful not to overfeed it. Give it water enough to settle the new soil, but no more water until it has recuperated and begun to grow, unless the atmosphere is so dry as to endanger the life of the plant. The most common error is too much watering. Sometimes the escape of gas in the house, or smoke of wood or coal, causes plants to suffer. In all cases of sick plants, withhold water for awhile, as we do food from a sick person who has no appetite, and whose system can therefore make no use of food.

Frozen plants should be immediately removed to a warmer atmosphere and *not* treated to cold water, as is too often the case. To prevent freezing in inadequate rooms, cover the plants with newspapers, fastening the edges of the paper together so as to prevent a circulation of air to and from the plants.

A number of winter-blooming plants can also be set out for summer decoration, as the carnations, heliotropes, Fuchsias, geraniums and the monthly varieties of roses; and the following will give a continuous bloom from June to November: Snapdragon, dwarf Dahlia, coral plant, Gladiolus, geranium, Pelargonium, Lantana, lobelia, Petunia, pansy, Pentstemon, passion-flower, Rondeletia, Salvia, Tropæolum, verbena, Veronica; and the following are useful only for the brilliant coloring or other peculiarities of foliage: Alternanthera, Achyranthes, Artemisia, Cerastium, Centaurea, Caladium, Coleus, Cineraria, Dracæna, Echeveria, silver, gold or bronze geraniums, variegated ivies and grasses, loose-strife (Lysimachia), Peristrophe, Sanchezia nobilis, Vinca major, etc. Of course, for full descriptions of varieties and many peculiarities of cultivation and propapation, one must consult the catalogues of florists, which can be obtained free. All the above mentioned can be raised from slips or cuttings taken from plants (or by seeds where noted in the catalogues), during the winter or early spring months, or from large plants which have been preserved for the purpose. One of the most common mistakes made by purchasers of plants in our city markets, is that of almost invariably choosing large plants *forced* into flower. Of course these plants are raised for market, and the raiser of them is not responsible for the drooping of the leaves and flowers, or entire death of the plant, soon after it is removed to its new home, where the temperature and other conditions are different. Nothing is more satisfactory to the lover of flowers than the raising of his own plants.

Window Gardening is very popular, and would be far more so if our climate were as favorable as that of some other countries. The principles of this art are about the same as those already inculcated, except that it is more important to turn the plants frequently so that every part may receive plenty of sunshine. Cleanliness is as essential to health in the vegetable as in the animal kingdom, and in some respects, perhaps, more so. Every plant being an organized existence, its health largely depends on its ability to perform its natural functions—analogous to perspiration, respiration, and digestion, in the animal economy. Remembering this, we see at once how much they suffer when covered with dust and the excretions of insects. As frequent washings are thus promotive of health, so frequent sprinklings over the foliage of most plants will act as the great antidote to disease, insects and decay. The insects and disease that infest and not unfrequently destroy plants, may be kept at bay to a considerable extent by good cultivation, which consists in providing at every stage in the life of a plant conditions favorable to its full development in any form desired. As a rule, the appearance of insects, or mildew, is an evidence of debility in the plant, induced very frequently by neglect of the ordinary rules of cultivation. The best remedial agents are air, water and light; but in aid of these we are sometimes compelled to employ tobacco, soap, sulphur, or patent preparations, made of no one knows what.

Whatever plants we cultivate, the more healthy they will be in proportion to the fresh air they receive. Those are the most dependent on this change of air which receive least sunshine, because in sunshine the plant, to a certain extent, purifies its own atmosphere. Air-giving, however, must be dependent on human comfort, as well as the welfare of plants, and should only be given when air above freezing can be admitted, and be careful to avoid draughts. When people talk of dry air being injurious to plants, they really mean impure air; air is seldom too dry A temperature of 55° gives more flowers than any other.

It is seldom necessary to shade a plant out of doors, but it is sometimes desirable to shade plants in windows. There, for instance, is a fresh potted plant, perhaps partially disrooted a week ago; the weather has been dull ever since; but to-day the sun shines brightly, and water as you will, every leaf wilts; there are greater demands made upon the leaves than the roots can, in their torpid state, properly meet; and in such a case, when the soil is wet enough, instead of deluging it with more water, the proper plan to adopt is shading, and sprinkling the foliage with water until the reciprocal action between roots and leaves is restored. But another evil is sometimes induced by continuing the shade longer than is necessary. Plants lengthen in heat, but increase only in unobstructed light; so that too much shade has the tendency to spindle out what previously existed. Use it, therefore, but do not abuse it.

A south window is the best position for plants during the winter and spring months. For the summer months, north or east is preferable.

Watering Plants. There is no subject more perplexing to beginners than this. When to water plants is governed by the circumstances of the plant at the time, whether growing, at rest, or approaching a state of repose, and on its position as respects sunshine or shade, and a high or low temperature; so that judicious watering is not so much a matter of regular routine, as of thought, intelligence, and adaptation to circumstances. Watch the first signs of distress, and there and then apply the relief. Do not wait for the proofs of suffering in the plants wilting and hanging their heads in festoons around the pots. As a general principle, the same rule holds good in respect to a cutting. Here is a Cactus; water it regularly, and you will kill it with juices it cannot get

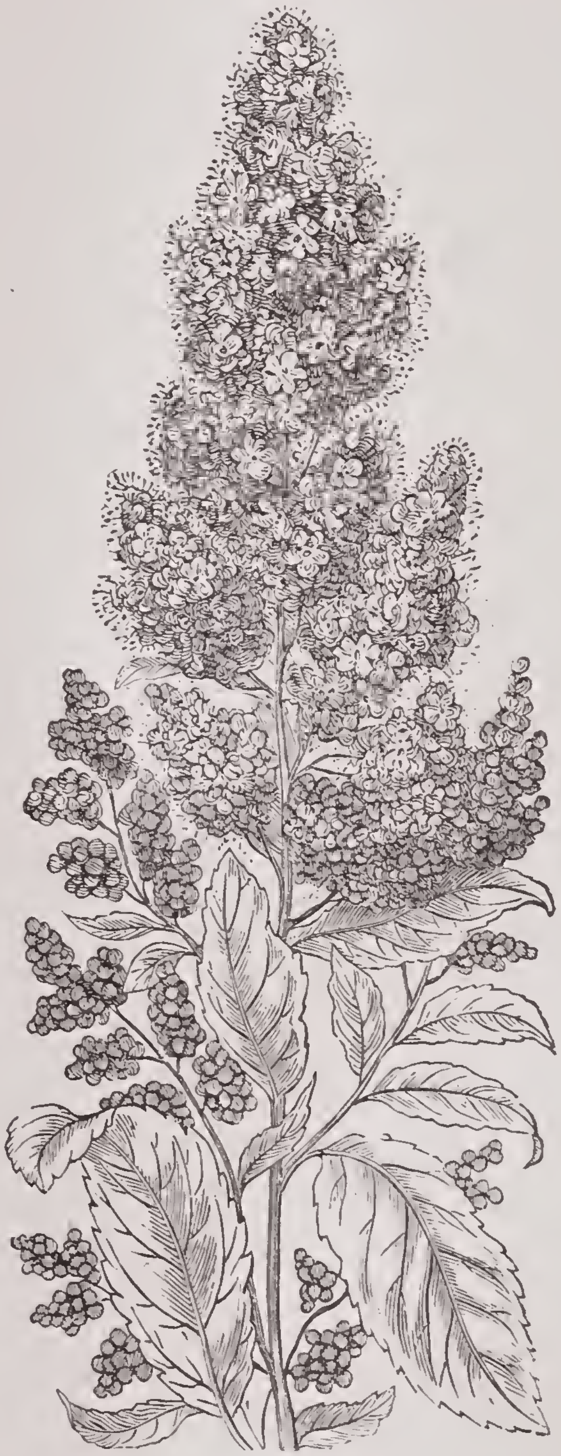


Fig. 1.—*Spiræa Eximia.*

rid of. There is a bulb which requires a season to ripen and another season to rest; continue to water it, and if you do not kill it, you will look in vain for flowers another year. Plants may wilt from weakness, or excess of sap in the tissues, or from sunshine on their leaves and stems, especially after dull weather, and yet not need watering. No doubt, during the summer months the evening is the best time, as at night every part of the plant is filled up with moisture, and the morning finds it enlarged in stature, or in size, and much renewed in health and vigor. Though many of the objections to watering in sunshine are largely theoretical, and appear only in the writings of those who have had but little actual experience, the real objection to watering in sunshine is, that the water is rapidly dissipated, and this prompt evaporation induces such an amount of cold that retards rather than stimulates growth. Whether plants grow most by day or night, may still be a doubtful question, though cultivators believe they grow most at night; certainly night growth would be still more effective were plants watered near sundown, as evaporation is so much less rapid at night, and this loss of heat is avoided. When water is given to the soil, let it be in such quantity as to reach every root, and then wait until the soil becomes dry again. Mere surface watering leaves you in ignorance as to the state of the bulk of the soil. To a great extent the same rule applies out of doors, encouraging surface roots at one time to render them liable to be scorched at another, while the mass of roots below is rendered torpid and inactive. Rainwater is best, as nothing is more certain than that hard water will kill hard-wooded, fine-rooted plants. It should be used at a temperature somewhat near that of the room, and is improved by exposure to sun and air. When kept in tanks below ground, it is frequently rendered as hard as spring water from its absorbing magnesia or lime from the materials of which the walls of the cistern are composed. Stronger liquids, containing some manurial matter in solution, if given, should generally be done at the period of flowering. Such solution should be weak and clear. All over-stimulation of the plant-system should be avoided: some plants bear it, but in others, as the carnation and rose, a distortion of the flower may ensue. The stamens may change into petals, petals into leaves, or the flower may become altogether double if the soil is too rich.

Manuring Flowers. Little or no crude manure should be used, as it induces a too luxuriant growth of foliage and wood, at the expense of the flowers. The liquid form is the best. It should be made very weak. One bushel of horse droppings, or two bushels of cow or sheep droppings, or a half bushel of hen manure or soot, or six pounds of guano, to one hogshead (60 gallons) of water, applied every two weeks, is about the proportion. Allow the liquid to stand two or three days before using, stirring daily. Use the clear liquid. For house plants, take a quantity of soot from a stove or chimney where wood is burned; pour hot water upon it, and when cool, apply. Common glue, one ounce to the gallon of water, is a good fertilizer. A few drops of ammonia to a quart of water, too, are excellent. If wood and foliage are desired, apply manure as soon as the buds begin to swell in the spring. Apply at intervals up to August, then stop. Plants over-urged after that date are apt to winter kill, for it is then the wood naturally begins to harden preparatory to its winter rest. When fine flowers are desired, do not apply manure until the flower-buds begin to swell. This causes a larger development of petals and enhances the colors. A good method of manuring or watering plants is to make holes 12 to 18 inches deep with a crowbar or stake, one to each square foot, near the plants. Fill these with the liquid and nothing is lost by evaporation; it soaks away in immediate contact with the roots, and there is no waste of material. Previous to planting the ground to flowers, it should be thoroughly drained and made rich with barnyard manure, or compost. A portion of it should be shaded by fence, hedge, screen or wall, for such flowers as delight in shade and moisture.

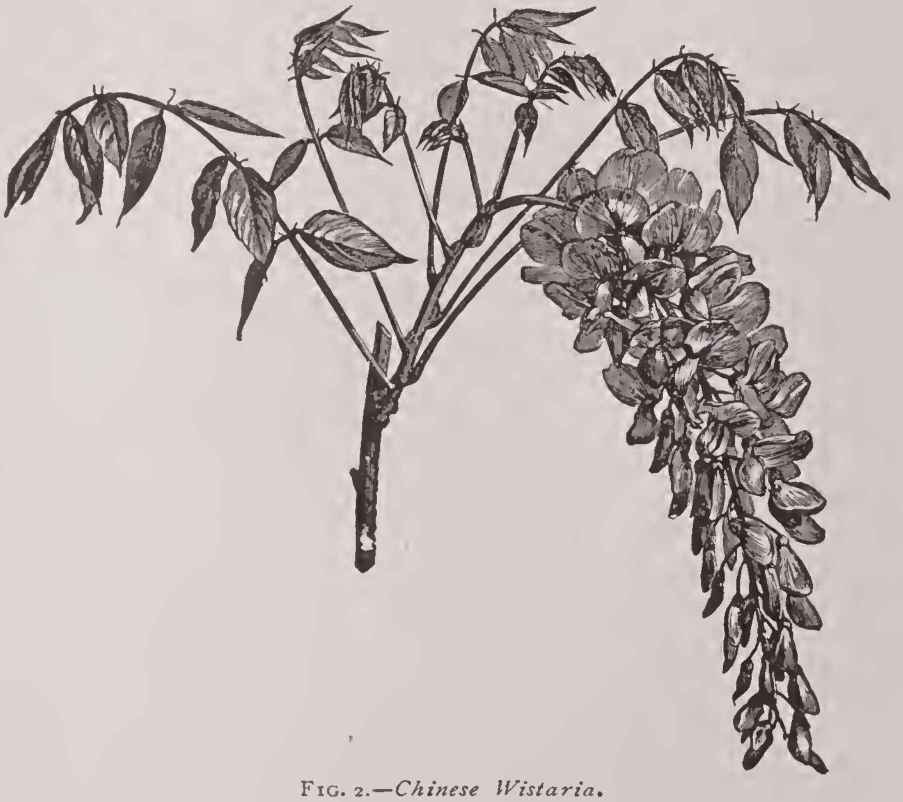


Fig. 2.—*Chinese Wistaria.*

Table. Plants in rooms are best grown in hollow tables lined with zinc, and deep enough so that the tops of the pots may be covered with moss.

What we will now discuss has reference chiefly to those operations necessary to keeping plants from season to season, and to providing ourselves with young plants from seeds or cuttings, a matter of no small moment to window gardeners, as it is seldom desirable that such plants should be very large.

POTTING PLANTS. Many of the plants we have tended with so much care are now demanding more pot room, or fresh earth, in similar or smaller sized pots, by getting rid of a part of the old soil. As a general rule, pots ranging from three to six inches in diameter are large enough for windows, increasing the size of the pot from an inch to an inch and a half in diameter. No plant should be transferred to a larger pot while its ball of earth is dry, as no ordinary watering would ever afterwards moisten it, nor should it stand deeper in the new pot than it did in the old one. In every case it is well to wait until a plant has filled with its roots every part of the pot it occupies before changing it into one of a larger size, and in all cases the compost must be pressed firm and to an equal degree of firmness all around the ball; for if less firm on one side than the other the water will drain away down that side, and the other side will be only partially moistened. When new pots are to be used, place them in a tub of water for several hours, allowing them to dry thoroughly before using. The reason for this is, that in proportion to the porosity of new pots would they extract moisture from the soil, forming a vacuum between the pot and the soil, which might deceive you very much in future waterings. Old pots are as good as new, only they should be clean inside as well as outside. Put a plant in a clean pot, and in time it will become well rooted. If you wish to re-pot it, the ball of earth will come away from the pot as clean as possible, but if the pot had been dirty or wet when used the ball will be broken and the roots very much injured. For house culture in general we would prefer hard-burned pots and of a light color, as the soil would then have a more even temperature and there would be less absorption and radiation of heat. Neat, strong pots might be made of zinc, and the outside painted so as to look very ornamental.

FIG. 3.—*Deutzia Crenata, the "Pride of Rochester."*

SOIL AND DRAINAGE. Loamy soils taken after removing the grass sod, with the addition of a little leaf mold, will grow almost any plant that would be a real ornament to a window. Leaf mold not only keeps other soils open, but from the vegetable matter it contains acts as the best assistant to plants. In practice it will be found that young plants of all kinds, and especially soft-wooded plants, thrive best in a light soil containing a large proportion of sand and leaf mold; whereas, plants that are advanced beyond the stage of infancy, and all plants of woody texture, require a firmer compost. The vigorous circulation induced by too rich soils should be avoided, as with abundant moisture they give us strong shoots and great luxuriance generally, but few flowers; to get these less water is needed, and more of the solid matter it contains. We see this in the well-ripened wood of the peach or grapevine, so necessary to good bearing, and generally in the fact of plants flowering, not on sappy shoots, but on the matured wood of the present or previous season. As a general rule, every plant in a pot over four inches in diameter should have one inch of drainage, over which place a layer of moss; it is valuable as a moisture equalizer, and will prevent the drainage clogging up.

RAISING AND PROPAGATION. The essential conditions necessary for raising plants from seeds are warmth, moisture, comparative darkness, access to atmospheric air, and a light, sandy soil. Whatever be the temperature in which a plant rejoices, a little more heat may be given to promote the germination of its seeds. Even the seeds of the most hardy plants will bear a strong heat with impunity, if, as soon as they are up they are gradually hardened off. Some seeds are so hard that we may bury them for months before the shell will be burst by the embryo, because moisture can not reach them; these may be soaked in water of a temperature of 130° for a couple of days. In sowing seeds, a good, general rule is to cover only to the thickness of their own diameter, and small, dust-like seeds should be sown on a damp surface, without any covering of soil whatever.

A box, a foot or so square and three or four inches deep, is better to sow seed in than a pot, as it retains moisture longer; and this is one of the secrets of raising plants from seed, as they are apt to perish if frequently watered before they have gained some strength. Fill the box to within one inch of the top with light porous soil and press smoothly with a piece of board, after which give a good watering with a fine sprinkler, then sow the seed and press gently into the soil. Cover the box with a piece of glass, and on that place any opaque substance, such as a piece of paper or a little moss, and stand the box in a shady corner. The glass will check evaporation from the soil and yet allow of the admission of air, while the box will absorb quite as much moisture as it parts with, and thus the soil will hold just enough moisture to slowly expand the integuments of the seed. Failures in raising plants from seeds are chiefly due to getting the seeds too deep, or from filling the pot or box too full of soil and sowing so near the surface that the seeds are dried up or washed away in watering.

Success in rooting cuttings will, in general, be in proportion to our skill in preventing the cutting feeling its removal from the parent plant. Hence, other things being equal, well-ripened shoots of deciduous plants are more easily rooted than those in a less mature condition, though if proper conditions were at hand the latter would root the soonest. Suppose you have a nice growing plant in your window early in May, and it has many young shoots on it two or three inches long, slip them off close to the stem, cut off a few of the lower leaves and insert a pot of sand, expose them to the sun and air in your window, and most likely your labor will be in vain; but cover the pot with a piece of glass, to keep the atmosphere about them moist, and shade from sunshine until they can bear it without wilting, and you will have rooted plants in as many days as you would have in weeks from deciduous cuttings. In general it is best to have a cutting cut off at a bud, as the vital forces are stronger there, and there is less danger of their decaying from extra absorption of water. Sand as a medium in which to root cuttings is preferable to anything else; because it prevents too much water collecting about the base of the cutting, on the one hand, and on the other the entrance of too much air to dry it up. Other methods of propagation are chiefly the separating of tuberous and bulbous plants and the dividing of the roots of herbaceous plants. Whenever plants get frozen they should be thawed out gradually, by putting them in a cool, dark place and sprinkling with cold water. When the frost has thawed out, restore them to the light. Lime water will remove the ordinary worms from plant pots; the strength is of no particular consequence, so long as the water is perfectly clear; but to kill wire-worms you must use salt, or some chemical stuff equally strong. The most effective plan to get rid of worms is to heat the soil.

PLANTS TO BLOOM IN WINTER. About the latter end of May plants intended to flower in winter may be placed in the ground up to the rim of the pot; they should be turned two or three times during the summer, to prevent rooting in the ground, and liberally watered: though if well rooted in their pots, most plants will do better turned out of their pots and planted in the ground. If treated in this manner, they should be potted early in September, and stood in a shady place until they become rooted in their new quarters. While in the ground during summer, they must not be allowed to flower, because the plant we wish to flower at an unnatural time of year must not have exhausted its flowering powers during summer. A plant well prepared for winter flowering should be well rooted in its pot, with plenty of flowering wood, ready, when properly supplied with the stimulus of heat and moisture, to burst into bloom; but plants taken from the ground after flowering all summer, potted, and placed in heat at once, meet every difficulty unprepared, and will generally fail, the steady high temperature allowing the formation of blossoms only to a limited extent, and by spring such plants are worthless. On the contrary, if the plants when brought indoors in the fall were placed in a cool, airy room, they would ripen their wood, become strong and vigorous, storing up strength against the demand that will be made upon them in the future; and when brought into the warmer air of another room and carefully treated, flower as liberally and as beautifully as the average of greenhouse plants.

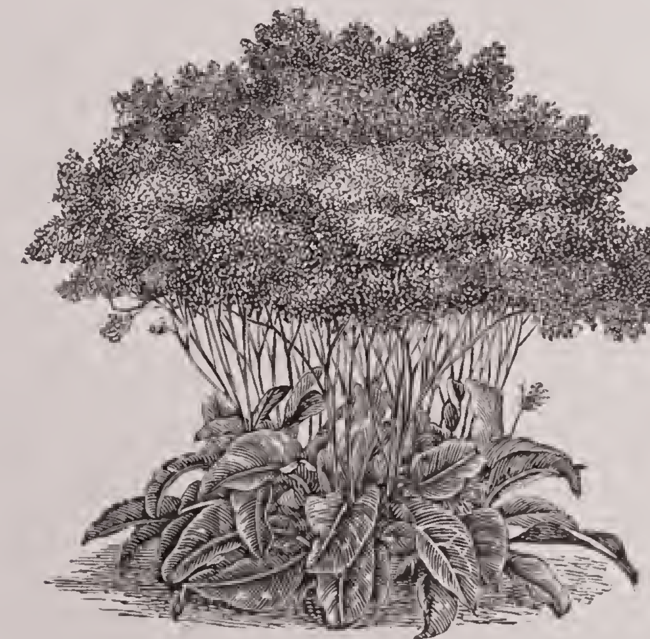


FIG. 4.—*Statice.*

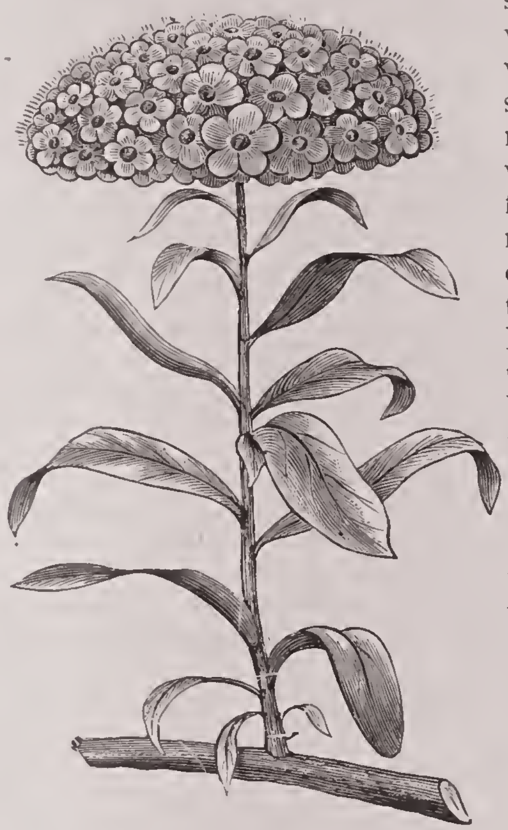


FIG. 5.—*Spiræa lanceolata.*

Some of the mistakes most commonly made by the inexperienced are, potting too loosely, filling the pots too full of soil, and making no provision for drainage. These matters seem small, but it is usually the attention to small matters that makes the difference between success and failure. It should be thoroughly understood that no amount of instruction can compensate for any lack of personal attention, as the art of plant-growing cannot be acquired from books; books are useful to give the impetus and to direct our energies aright; but proficiency is only attained by attention to causes and effects; if there is an interest in the work at its commencement, that interest will increase as skill and dexterity are acquired. The plants suitable for house culture are far more numerous than is generally supposed; we can therefore mention but a few, and those such as are more generally known; and first, there is no plant with which success is more certain than the Chinese primrose, as it readily accommodates itself to all conditions, and is in bloom from December to May. In the latter month place them out of doors, where they get but little sun, and during the summer pick off all flower buds as they appear. They should be repotted in spring. The Calla lily should be in every collection. It is not a lily, but popularly it is so. To have it flower in winter, it should be exposed to the full summer sun without water. Re-pot in August, shaking off the old soil, and place the pots in an exposed position until they are taken indoors at the approach of frost. The Calla likes an abundance of water and light. If it is of the spotted-leaf variety, they die down and rest every fall and start again every January or February. Give them plenty of hot water—on the earth, not on the plant. All Callas need plenty of water. When at rest, no water. The Cyclamen thrives well in an atmosphere where other plants suffer, as it seems to be but little affected by the impure air of our rooms. Re-pot the bulbs in September or October, placing them in their pots so that the crown of the bulb will be just above the surface of the soil; stand in a sunny window and water while the plant is in bloom and the leaves green. After the flowers have faded, and the leaves show a yellowish tinge, gradually withhold water and place the pot in a shady position out of doors for the summer, but never allow the bulbs to shrivel.

The Lady Washington geranium, after flowering, should be placed out of doors for some weeks to ripen its wood, giving no more water than will keep its leaves from wilting; you must then prune back to two or three buds of the old wood, keeping rather dry for a week or so, when they may be watered; re-pot into small sized pots; when the young shoots have grown one inch, trim back any straggling roots, and in February transfer to a large pot in which it will flower. All varieties of the Pelargonium are readily grown from cuttings planted in July or August, or from seed sown in spring. The variegated, scented zonales and ivy-leaf geraniums are all desirable, especially the zonales, which are valuable for winter blooming. Fuchsias should be brought from the cellar in February or March, and pruned back closely; water sparingly until growth begins, then transfer into smaller pots—using larger ones until it is desired to have them flower; after flowering, withhold water and return them to the cellar during winter. The Fuchsia likes partial shade, rich soil, and plenty of water. Carnations of the tree kind bloom freely in the window. Cuttings may be rooted at any time during winter; pinch out the center of the young plant, and plant in good soil out of doors in spring; pot in September, before severe frost. It is necessary to start with young plants every spring. Oleanders are readily grown from cuttings in a phial of water. We must prune and treat this plant as we wish some of the shoots to flower this year, and some the next; or all this year and none the next. Whether a plant blooms every year, or every second year, the flowers can only be produced one spring and summer at the ends of shoots grown and matured last season. Here in May is a plant with two shoots: one shows signs of flowering, the other not; cut the flowerless shoot down to near its base; from thence you get two or three shoots for next year; when done flowering, cut that shoot down also, so as to obtain a further succession of shoots; these are induced to grow as much as possible until September, after which keep in a low temperature, and give but little water until growth recommences in April.

Of the roses, the everblooming class are the best for house culture. Roses for winter blooming are usually grown in pots all summer; but two or three year old plants may be grown and flowered in the ground all summer, and if potted early in September, and kept from wilting, they will fill their pots with healthy fibers by October, and flower abundantly all winter. The case is different, however, with younger plants grown in the ground; these having few if any feeding roots, must be kept at a low temperature for some time until nature has restored the loss incurred in digging them up. These roses should be potted in October, and placed in a cool, light cellar until February, then placed in a sunny window where they will flower the remainder of the winter and spring months. If you want oleanders to grow all the time give them warmth and water, in a rich soil mixed with sand; but they will do very well to grow out all summer, and set in the cellar in winter with water occasionally while in a state of rest. Take up tuberoses, keep in a warm, dry place till spring; let the tops be on, as the substance in them will be absorbed by the root. When you set it out, take off the offshoots, if any, and plant by themselves for bloomers another year, as the old root never blooms but once, and must be three years old to do that.

All of the cactus tribe should be treated somewhat alike. Use sandy loam and lime rubbish, with a little leaf mold, for potting. They bloom chiefly during the summer months. Water liberally until the middle of September; from this time until March they will hardly need a drop, unless the stems get very brown and shriveled. Commence watering them in the spring very gradually.

Plants with slender drooping foliage are most suitable for baskets, such as the Smilax and Maurandia. The former has a tuberous root, and should be dried up in summer. The nasturtion, especially the dwarf, dark varieties, climbing and drooping, are very desirable. The German and English ivies are graceful and of very easy growth, as are also the well-named rat-tailed cactus and the so-called ice plants. All of these are good, and are but a few of the many available for this purpose.

Fern cases are a never failing source of pleasure when properly managed, the soil for which should be a sandy loam and leaf mold. Give water sparingly in winter and more abundantly in summer. Occasionally admit a little air, and when not too powerful, expose the case to the influence of the sun. No doubt nine-tenths of the cases in use are supplied with an excess of moisture. Drainage and having double bottom attached to the case to catch the surplus water would remedy this. To plant a fern case it isn't absolutely necessary to purchase expensive plants, unless you prefer to do so; for if we go out into our woods and marshes we shall there find plants and flowers that are the admiration of thousands on another continent. Almost every house has a cellar, which, if dry and frost-proof and has good light from windows on the south, east, or west side, but no openings to the north, would be a suitable place to keep many plants in winter. Let it be remembered that the great essential to their preservation is dryness. A plant will exist during winter and at its period of rest, even if very dry, though the extreme of dryness sometimes causes decay. When obliged to water, let it be given in mild weather and just sufficient to maintain life. Geraniums, Fuchsias, the Agapanthus, hydrangeas, and orange and lemon trees are a few of the many plants that may be kept in this way. The care that they require is but trifling and is amply repaid by the increased vigor of such plants in summer.

Fig. 6.—*Hydrangea.*

As to dahlias and everlastings, the greatest object is not to plant them out before all danger of frost is is over. Put your roots in a box and cover them with ground, rich garden soil, about the middle of March, and keep them in a warm place to sprout. When you want to plant them, take them out and divide the roots, never allowing more than one or two to grow in one place. If you wish to get new varieties without going to the expense of purchasing them of the florists, you can sow the seed. Sow them only in the spring in a sunny window. They will bloom the first season, but you must not be discouraged if the flowers are only single. They will double themselves the next season provided the roots are dug up after the first hard frost in the fall, and dried in the air a day or two, and then kept where they will neither freeze, rot, nor dry up.

Hanging Baskets, Hanging Pots, Pots on Stumps, or on imitations of stumps, and many other rustic designs, and plant stands, Wardian cases, ferneries, etc., are common in floral culture. A glance at illustrative cuts will give any amateur a start in his imaginations, enabling him to originate others according to his own fancy. The best way to water a plant in a hanging basket is to submerge the whole in water until it is thoroughly saturated; but this should never be done except when the earth is dry in which the plant is growing. To ascertain when it is dry enough for the process (for the earth should not be watered little and often, as some people feed babies), dig out a little from toward the center and pinch it between the fingers; if it sticks together like putty it is not dry enough to be watered. It is often a good plan to grow moss over the surface of the earth around the plant when in the shade. This is impracticable in the sunshine, where plants are put in order to make them bloom. In the latter case, however, dead moss is the best mulching.

Greenhouses should be built with their gable ends north and south, so that sunlight will be equally distributed to the plants; or, if attached to a house, they should be on the east or south side, or the southwest side. If a detached greenhouse is made on the shed-roof plan, that is, with the whole roof slanting one way, of course that roof (of glass) must face the south and the gable ends of the greenery would be east and west. The walls below the glass should be of wood, as the heat inside during the winter, when it is very cold outside, will destroy any stone or brick wall. Use roofing paper with the frame wall, and a good cheap structure can be had. A hot-house is so made by putting a heating apparatus into the greenhouse. Of course no one will undertake to build these structures without carefully inspecting a good one or two. Very good cheap, neat greenhouses for many plants can be arranged by altering the cellar. See Greenhouse.

Fig. 7.—*Moss Pink.*

As sunshine is necessary for the development of flowers, shady places should be utilized by putting in them such plants as Calceolarias, Fuchsias, lobelias, herbaceous phloxes, pansies, forget-me-nots, lily of the valley, etc., whose native habitat is shady woods; or foliage plants, as Coleuses, amaranths, Achyranthes, Caladiums, Cannas, Centaureas, Cinerarias, Gnaphaliums, etc.

The seeds of all trees and all those plants whose native habitat is deep, shady woods, must be germinated in cold frames, covered with lattice work or shaded with twigs of evergreens; and all plants started in the shade must continue to have shade provided for them when they are transplanted to the open border, until they have become hardened to the new situation.

Plants kept in the windows during the summer months will, if in a sunny exposure, require some kind of a shade; and if the one provided to keep the sun from the room shuts out too much light, or excludes air as well as the sun, something must be provided which will give protection during the heat of the day and still allow sufficient light and circulation of air. Any one with ingenuity can arrange a screen of white cotton cloth to answer the purpose.

The old practice of stripping the greenhouse in the summer is falling into disuse, and by proper selection of plants and sufficient shade, it is made as attractive then as at any other season; but, even for tropical plants, it must be shaded. For a small lean-to, a screen of light canvas or muslin arranged upon the outside, so that it may be wound up on a roller when not wanted, will answer; and if it be desired to keep the house as cool as possible, this should be so contrived that there will be a space of six inches or so between that and the glass. The roof of a large greenhouse, however, of the curvilinear form is generally whitewashed. The whitewash is gradually washed off by the rains during the summer, so that by fall there will be but little to do to finish the task. Later in the summer the plants can receive about as much more light as such an arrangement will furnish. By spattering the wash upon the glass, different parts of the house can be shaded heavier or lighter, as may be needed.

Flower Gardens for Children. Children love flowers quite as much as older people, and if they are permitted to have a small garden of their own, in which they can plant and dig and weed and hoe and use the tiny little implements that are made so cheaply for the flower garden, they will not only take the greatest delight in its possession, and in the buds and flowers, but will also gain a large amount of health and muscular development. Their love of the beautiful will also be largely cultivated, and they can be taught to give flowers to the sick and the poor children, and learn that to give pleasure to others is the surest way of receiving it themselves. But of all the lessons to be taught to children by working in a garden, the most valuable is the art of observation. So minute, so varied and so delicate, and yet so unerring are the operations of nature, that, although the closest study may fail to divulge her secrets, the rewards of such study are so rich and so surprising that they are stimulated to fresh researches. Let the child plant morning-glories to run over a bean-pole or strings which bloom so brightly every morning, mignonette and sweet alyssum and forget-me-nots to make tiny, sweet bouquets. Then give a monthly rosebush, a geranium, feverfew, and some verbenas and pansies, and there will be an amount of flowers that will gladden the hearts of a shopful of children. If the kind mother will attend to it and have the beds laid out, and teach her darlings how to plant the seeds and plants, she will give them an occupation that they will not weary of while life lasts.

Varieties. In the following list of flowering and ornamental plants we have endeavored to comprise all the species found in cultivation, giving the English or common names where any were given in Gray's Botany, and elsewhere giving the scientific names. There is a growing tendency among floriculturists to use the scientific names only, as they are more definite and universal than the so-called "common" names, which are generally very local, limited or provincial, and often ambiguous. Of course we do not undertake to name the varieties, as there are many thousands of them, and hundreds of new varieties are originated or introduced every year. The amateur florist will consult the annual catalogues for the new varieties from time to time. If the reader does not find in the following list the name he is looking for, the plant is possibly mentioned elsewhere under another name. The list here is so compiled as to be reliable and convenient for ready reference, and from it one can make such selections as will suit his taste and be adapted to the space, quality of soil and climate, situation and other resources he or she may have at command.

Abutilon, Striped. A tall greenhouse shrub, with large, orange-colored flowers on long slender stems.

Acacia. There are nine species of this beautiful shrub or tree cultivated in the conservatories of the country; the beauty consists generally in the foliage.

Achyranthes or Iresine Verschaffeltii. An amarantaceous plant, cultivated for its red foliage.

Adam's Needle. Bear-grass.

Adonis, Pheasant's-Eye. A small scarlet and crimson flower of the Ranunculus or Crowfoot order.

Adonis, Spring. A plant of the Crowfoot order growing only six inches high and bearing large, showy yellow flowers in early spring.

Ailantus, Chinese Tree of Heaven. A thrifty growing tree of the appearance of sumac; the staminate flowers are very ill-scented; hardy.

Alder. Rarely in cultivation.

Allamandra. A showy shrub of the conservatory with golden yellow flowers.

Allspice, Carolina, or Sweet-scented Shrub. Bears fragrant strawberry-scented blossoms during the spring and summer. The Japan allspice has small fragrant flowers in mid-winter.

Aloe. The American is common in amateur cultivation; has very thick, heavy leaves like a cactus; after many years, like its congener, the century plant, it blooms, perfects one crop of seeds and then dies.

Alonsoa. An annual producing orange-scarlet flowers all summer.

Alyssum, Sweet, or Madwort. Its honey-scented flowers continue all summer.

Amaranth. The globe amaranth or bachelor's button, cock'scomb, prince's feather and love-lies-bleeding are all popular plants of the amaranth genus.

Amaryllis. Several genera from different parts of the world. They are bulb plants and of easy cultivation; some of them furnish beautiful crimson red flowers.

Anagallis, is being multiplied into showy varieties.

Andromeda. Of this ornamental shrub there are two or three species; the foliage of one, called the stagger bush, is said to be poisonous to lambs and calves.

Anemone coronaria. Leaves cut into many fine lobes; flower blades very broad.

Anemone hortensis. Leaves less cut than the former, with broader lobes and narrower flower blades.

Anoda. Two species, sparingly cultivated for ornament.

Apple, Chinese Flowering. Has showy, bright, rose-colored flowers; several varieties of the Siberian crab are quite ornamental.

Arbor vitæ. Makes the most beautiful hedge for borders.

Arrow-wood, Laurestinus. A common house plant flowering in winter; flowers white; fruit dark purple.

Ash. The flowering is not hardy north, but the English or the European is; the weeping is a variety or " sport " of the latter.

Aspen, American, Quaking Asp. Rarely planted.

Aster. Golden, China and many other varieties.

Astilbe or Hoteia Japonica. Has compound leaves and crowded white flowers of considerable beauty.

Azalea. Chinese and other kinds, variegated and showy flowers.

Bachelor's Button. Globe amaranth.

Balloon-vine, Heart-seed, is a well known herbaceous vine producing inflated pods; whence the name.

Balm-of-Gilead. Suckers too freely.

Balsam. The garden balsam is well known; so also is the species called touch-me-not and jewel-weed, the pods of which when ripe burst with a snap.

Balsam-Apple, Wild. A rank grower and good for arbors; sometimes called wild cucumber.

Balsam Fir: see Spruce.

Banana. In expensive greenhouses. Strelitzia reginæ is a stemless plant flowering in winter; Musa sapientum is the banana proper, cultivated both for its foliage and for its fruit; but the easiest to manage is the dwarf species, the Musa Cavendishii.

Barbadoes Flower. A small tree, prickly, with twice pinnate leaves and clusters of large, showy, reddish-orange flowers at the ends of the branches; crimson filaments extend beyond the rim of the flower.

Barberry. Cultivated both for fruit and ornament. Besides the common species there are the wild, the holly, the creeping or yellow, B. nervosa and the Japan. The latter is spiny. See also page 45.

Barren-wort. Is a low herb of the Barberry family, with beautiful foliage. There are two species, one with large flowers.

Bartonia, Mentzelia. Flowers white, large and showy.

Bean, Egyptian or Black. Has long clusters of showy violet, purple or white flowers, which are one inch long; beans black or tawny.

Bean-Trefoil Tree. Laburnum.

Bear-Grass, Spanish Bayonet, Yucca. An odd plant; but the most common species is Adam's needle, which is easy of cultivation.

Begonia, Elephant's Ear. Several interesting species, having only scientific names, can be propagated by the leaves used as cuttings.

Belleflower, Harebell. Several species.

Betony. Rarely cultivated; a hardy plant of the Mint family with purple flowers.

Bignonia. Interesting woody climbers, reaching up into tall trees.

Birch. American White, Paper or Canoe, European and other species.

Blackberry Lily. A plant of the Iris family bearing orange flowers mottled with crimson spots; fruit of the appearance of a blackberry; flowers late in summer.

Bladder Senna, Common. Hardy; has clusters of yellow flowers and very large pods; the Oriental has saffron-colored flowers and reddish pods, opening before they are ripe; scarcely hardy.

Bleeding Heart. Is a well-known, beautiful plant, having peony-like leaves and fanciful heart-shaped flowers of bright pink red.

Blue-Bottle, Corn Flower. A plant of the Centaurea or star-thistle genus.

Blue Flag. A large sort of Iris.

Blumenbachia. Two curious plants from South America, flowering all summer; one species is also called "Loasa" and "Caiophora."

Bocconia. A hardy plant of the Poppy family from China, having large clusters of small white or pale rose-colored flowers in mid-summer.

Borage. Now abundant as a weed.

Bottle Brush. See Myrtle.

Bouncing Bet. Has proved so hardy as to become a common weed in many places.

Bouvardia. An ornamental plant of the Madder family blossoming in winter.

Box-Elder, Ash-leaved Maple. The best known shade tree, but is abandoned for more sightly trees.

Box, Tree Box, Dwarf Box. Shrubs of the Spurge family, planted chiefly for borders.

Brachycome. An herb from Australia one foot high, the ray flowers being violet blue and the center dark purple.

Bramble. Brier Rose, from China; is a greenhouse plant bearing full double white flowers resembling small roses. One or two other species of Rubus are also ornamental.

Brier Rose. Bramble.

Broom. The Scotch variety is hardy, growing three to five feet high; the Irish is not hardy, and the Spanish is very rare. These are pod-bearing shrubs.

Browallia. A conservatory shrub of the Figwort family, flowering all summer.

Brunfelsia. A conservatory shrub of the Figwort family, having very showy flowers.

Bryophyllum. Is a curious house plant, propagating itself by the edges of its leaves; flowers in clusters, green and tinged with purple.

Buckeye. There are a half dozen species in ornamental cultivation.

Buffalo Berry. An ornamental fruit-bearing shrub, increased by layers or seeds.

Burnet. A Rosaceous plant, one or two species of which are common in old gardens.

Burning Bush, Waahoo, Spindle-Tree. A small tree bearing dark purple flowers and bright crimson-red fruit in autumn, which are very conspicuous after the leaves have fallen off. The four species in cultivation are the burning bush, the American strawberry bush, the European spindle-tree and the Japan spindle-tree.

Buttercup, Tall. Double-flowered, forming golden-yellow balls or buttons.

Cactus. Common prickly pear; many remarkable species difficult to describe, including many which are tree-like or vine-like in their habits,—the melon cactus, the night-blooming cereus, old man cactus, etc.

Caiophora. Blumenbachia.

Calampelis. Eccremocarpus.

Calceolaria. Many varieties; some herbs and some shrubs; mostly house and bedding plants.

Calico Bush. A species of laurel.

Calla. Richardia.

Camellia, Japan. Flowers through the winter.

Canary-bird Flower. Nasturtium.

Candytuft, Common. Has flat clusters of purple, lilac or pale flowers. An evergreen variety has pure white flowers.

Canterbury Bells. A species of bellflower.

Castor-Oil Plant. Well known.

Catalpa. Besides the two common and well-known species, a kind from Japan is beginning to be planted; leaves smooth and the flowers one-half smaller than the common.

Cedar. The Red Cedar is a juniper and the White is a cypress.

Celandine. A plant of the Poppy family having small yellow flowers and long, slender pods.

Celandrina. A plant of the Portulaca or Purslane order, having purple flowers on the summit of a naked stem.

Celsia. Flowers orange yellow, with some purple, blooming in summer; plant scarcely hardy.

Century Plant. A tree of the aloe kind, said to bloom but once, namely, when 100 years old; whence the name; very rare in cultivation.

Chamomile. A very aromatic bed plant, ornamental and medical. Not cultivated much at the present day.

Chaste Tree. Interesting leaves and flowers; hardy, but rare.

Chickweed. The cottony mouse-ear chickweed is characterized by white willow leaves, making dense silvery mats.

Chinese Yam. A twining plant growing from tubers, and is cultivated for ornament and its edible root, which is something like a sweet potato.

Chorizema, Holly-leaved. A greenhouse pod-bearing plant from Australia; bushy, with leaves cut into strong spiny teeth or lobes, and clusters of small copper-colored flowers, the wings of the flower redder.

Christmas Rose, or Black Hellebore. Flowers white, turning pinkish, then green; blooming in earliest spring; leaves shining; evergreen.

Chrysanthemum. The Chinese flowers in late autumn, mostly full double; summer; has yellow or whitish flowers; C. Roseum, from Persia and Northern Asia, is coming into cultivation; the pulverized flower heads of the latter form the well-known Persian insect powder.

Cineraria. Two or three species are often found in the greenhouse.

Clarkia. A genus of the Evening Primrose order; two beautiful species, from the Pacific States, have showy flowers.

Clematis, Entire-leaved. A species of virgin's bower with small blue flowers and the leaves not toothed or notched.

Clematis, Pale. Has silken leaves and flower.

Clematis, Great Flowering. Flower three to four inches wide, white purplish; not hardy. Another species has flowers five to seven inches wide and is hardy.

Clematis, Heavy-Scented. Yellow flowers; hardy.

Cleome. The tall species has prickly points at the bases of the leaf-stems, and pink or purple flowers; the lower kind has entire leaves. Both are beautiful and hardy.

Climbing Bittersweet. Bears beautiful berries called "wax-work."

Cobæa. A favorite annual plant of the Phlox family from Mexico.

Cock'scomb. Amaranth.

Colchicum. Has rose-purple or lilac flowers; sparingly cultivated.

Coleus, Foliage Plant. Celebrated for the various high colors of its foliage in the several species.

Colocasia. A plant of the Indian Turnip family, sometimes cultivated for its magnificent foliage; its farinaceous root-stocks are made edible by heating.

Columbine. There are several species of columbine, all characterized by pendulous six-spurred flowers, some kinds of one color and other kinds of other colors. The species are the wild, Mexican, long-spurred, common garden, glandular and Siberian.

Cone-flower. Rudbeckia.

Coral-berry, Indian Currant. Has white flowers during the summer; berry small and dark red.

Corchorus. Kerria.

Corn Flag. Gladiolus.

Corn Flower. Blue-bottle.

Coronilla. A beautiful genus of pod-bearing plants, the purple species bearing handsome pink-purple and white or white lilac flowers during summer, and is hardy; and the yellow sweet-scented, a greenish plant, produces yellow, sweet-scented flowers.

Costmary. A tansy-like herb with pleasant scent.

Cotoneaster. A rosaceous shrub from Europe having white or flesh-colored flowers in spring. Several evergreen species are sometimes found in cultivation.

Cotyledon. A house-plant of the Stonecrop order, not common; one, called also Echeveria, is shrubby at the base, has leaves in rosettes, and flowers in a leafy spike, red outside and yellow within.

Cow-Herb. An herb of the Pink family having pale red flowers during summer.

Crape-Myrtle. A conservatory shrub with showy, pale rose flowers of several remarkable features.

Crassula. Three species of house-plants like stonecrop.

Crinum. A showy genus of the Amaryllis family in conservatories.

Crown Imperial. A lily-like plant with large, orange-yellow flowers, sometimes almost crimson, hanging under the crown of leaves.

Cuckoo-Flower, Lady's Smock. Has showy pink or red flowers. A double-flowered variety used to be cultivated.

Cucumber Tree. Magnolia.

Cuphea. An ornamental shrub from Mexico.

Currant. Besides the common fragrant golden currant there is the red-flowering, which is very ornamental.

Cyclamen. Of this beautiful perennial herb there are two species in house cultivation.

Cypress. The "white cedar" is the only species of cypress hardy enough for northern cultivation.

Cytisus Canariensis. Bears small, sweet-scented flowers all winter. Sometimes called "Golden Chain."

Daffodil. Narcissus.

Dahlia. Of nearly all colors; is well known.

Daisy, True or English. Well known.

Daphne, Mezereum. A low, hardy shrub with rose purple flowers in clusters, appearing in early spring before the leaves appear; berries red.

Datura, Thorn-apple, Stramonium, etc. Several species of this singlar plant are being introduced from foreign countries; congeners of the famous jimson weed.

Desmodium gyrans. One of the most extraordinary plants known, as its leaves have a constant spontaneous motion when the temperature is about 80°. It is readily grown as a tender annual.

Deutzia. There are two or three species of this fine flowering shrub from Japan and China.

Digitalis, Foxglove. The purple species is the most interesting; blooming during the summer.

Dogwood, Japan. A pretty shrub, but tender at the North.

Dracopsis. A composite sometimes cultivated for ornament.

Dropworth. A spiræa from Europe with tuberous roots, interesting foliage and clusters of white or rosy-tipped flowers; one variety full double.

Dusty Miller. An old-fashioned house-plant, ashy white all over.

Eccremocarpus, or Calampelis. A plant of the Bignonia family cultivated in conservatories for its interesting blossoms.

Echites. A tall, woody climber with fragrant white flowers two inches broad.

Elecampane. An old-fashioned garden plant raised mostly for medical purposes.

Erythrina Crista-Galli. A conservatory pod-bearing plant from Brazil, producing loose clusters of large crimson flowers and a tree-like trunk.

Eucharidium. A plant of the Evening Primrose family from California.

Euphorbia, Spurge. Singular plants; several species.

Evening Primrose. Several species from the West are beginning to be cultivated. They are all beautiful and hardy. Some also from the older States are beginning to be cultivated.

Fair Maids of France. A white, double-flowered Ranunculus.

False Indigo. Bearing blue flowers in July.

Fennel Flower, or Ragged Lady. Bluish flowers and spicy seeds.

Fern. There are the stag-horn, hart's-tongue, gold, maiden-hair, chain, lady, beech, shield, bladder, ostrich, sensitive, hare's-foot, climbing, flowering, moonwort, etc., besides a hundred kinds which have no English names, and descriptions would be too tedious here.

Fig Marigolds. Fleshy plants between the cactus, purslane, and stonecrop; includes the ice-plant, the hatchet-leaved and the scimitar-leaved fig marigolds.

Fir. Spruce.

Flax. Perennial, large-flowering red, and Linum trigynum are three interesting species; the perennial has sky-blue flowers, the second mentioned has crimson red, and the last bright yellow flowers.

Flower de Luce. Iris.

Flower of an Hour. Used to be cultivated for ornament, but has become a common weed.

Forsythia. Ornamental shrubs of the Olive family flowering in early spring.

Four-o'clock. A common flowering herb putting forth its purple flowers in the middle of the afternoon.

Foxglove. Digitalis.

Fringe Tree. Well known. See also Smoke Tree.

Fuchsia. The short-flowered are called also lady's eardrops; there are two long-flowered and one panicled species.

Gaillardia. Two species of this composite are cultivated for ornament.

Garland Flower. A plant of the Ginger family from India, bearing a large spike of handsome light yellow flowers and very ornamental foliage.

Gazania. Has a large, showy head, flowering all summer when bedded out.

Geranium and Pelargonium. Several species and many varieties; the most popular house-plant in this country.

Gesneria. Plants of this genus are somewhat like the broom rape, and in cultivation are very showy.

Gilia. A plant of the Phlox family from the Southwest; there are several species, some of which are choice annuals.

Gladiolus, Corn Flag. Several species and many varieties; common.

Globe Flower. Globular, bright yellow; another species is deep orange yellow.

Goat's-Beard. A beautiful wild spiraea growing native in the deep-wooded ravines of this country.

Golden Chain. Laburnum.

Golden Garlic. Ornamental, flowering in summer.

Gourd. Orange or egg, has variegated fruit. Some other remarkable gourds are raised as curiosities.

Grass. Of ornamental grass the most popular kinds are, the Pampas, large quaking or rattlesnake, the ribbon, etc.

Greek Valerian, Jacob's Ladder. A phlox-like plant.

Ground Laurel. Trailing Arbutus.

Ground Pink. A small phlox.

Guavo. See Myrtle.

Guelder Rose. Snow-Ball.

Guinea-Hen Flower. A lily-like plant producing single, purplish flowers, tesselated with blue and purple or whitish.

Gypsophila. A plant of the Pink family furnishing beautiful white or slightly rosy flowers; there are two species.

Halesia. Snow-drop tree; has beautiful flowers. See Landscape Gardening.

Hardenbergia monophylla. A pod-bearing plant, and a choice variety for the greenhouse; has a single leaflet for each leaf, and slender clusters of small violet-purple flowers.

Hawthorn. See Thorn.

Heath. A species under this name is sometimes planted.

Heliotrope. Several popular species; flowers various colors.

Hibiscus. Great red, or great red rose mallow. Has a bright red flower six inches wide.

Hibiscus, Tree, or Shrubby Althea. Flowers of various colors, sometimes double; stems short. China hibiscus, or rose of China, is a splendid plant cultivated in conservatories. The flower stains black, will even blacken shoes; colors various and variegated, and sometimes double. Several species grow wild and are not cultivated.

Holly. The American is a tree 20 to 40 feet high, with spiny-toothed leaves; the European has more glossy and spiny leaves and brighter red berries, not quite hardy; Dahoon is a shrub or small tree; Yaupon, the leaves of which are used for Yaupon tea in the South.

Hollyhock. An old-fashioned, well known and showy plant.

Honesty, Common Honesty or Satin-flower. Flowers large, pink purple. The partitions of its very singular, large oval pods have a satin-like luster and are used for ornament.

Honey Locust. Sometimes preserved as an ornamental tree in the North.

Honeysuckle, Woodbine. The trumpet has evergreen leaves, flowers scarlet outside and yellow inside, and berries red; common European has leaves smooth on both sides and blooms usually only in early summer; Italian or perpetual has its leaves downy beneath and blunter; flowers through the summer; sweet wild has a white flower with a slender tube, fading yellowish, fragrant; the yellow has light yellow flowers; the small is low and bushy, flowers tinged with purple; Japan or Chinese, flowers reddish outside and very fragrant in the evening; Tartarian, flowers profuse, pink red and showy; bush, a shrub two to five feet high loaded with handsome flowers.

Horse Chestnut. A fine lawn tree. The Æsculus rubicunda is a red-flowering species.

Hoteia. Astilbe.

Houseleek, Live-for-ever. Well known.

Hyacinth, Wild, or Squill. Sometimes cultivated for curiosity; the grape or globe variety is common; the "common" has a cluster of blue flowers; there are many varieties of this species.

Hydrangea. A well known, showy house plant from China. See engraving, page 489.

Hyssop. A celebrated, old-fashioned herb.

Indian Cress. Nasturtium.

Indian Shot. A plant of the Arrow-root family producing very hard seeds like shot; several small genera are cultivated for their foliage.

India-Rubber Tree. Vigorous in house cultivation.

Iris, Crocus, Flower de Luce, Fleur de Lis, Blue Flag. There are many species and varieties of each.

Italian May, St. Peter's Wreath. A spiræa three to six feet high, producing small flowers.

Ivy, English or European. A common house vine.

Ivy, German. A climbing compound flower of the groundsel genus, from the Cape of Good Hope.

Jacobæan or St. James' Lily. A plant of the Amaryllis family bearing a crimson red flower.

Jacob's Ladder. Greek Valerian.

Japan Quince. A hardy shrub putting forth its large red flowers early in the spring.

Jerusalem Sage. In old gardens.

Jessamine. The common sweet yellow, of the Olive family, is a tender house plant; the common white is another species, and there are several other species in this family which have no English names; there is also another "yellow jessamine," of the Nightshade order, which is a woody, twining climber with evergreen leaves and showy flowers. They are only half hardy at the North, and ought to be laid down, or covered with straw or banked with earth.

Jonquil. Narcissus.

Juniper. The common and the red cedar or savin are popular.

Kenedya rubicunda. A pod-bearing plant from Australia, climbing; hairy, with dark-red crimson flowers over one inch long. Conservatory.

Kentucky Coffee Tree. A native forest tree of the latitude of the Ohio river, with very beautiful compound leaves and bearing glossy mahogany-colored beans.

Kerria Japonica, Corchorus. Is a Japan shrub of the Rose family four to eight feet high, with handsome yellow flowers, usually full double.

Kitaibelia, Vine-leaved. A rough-hairy herb with a dull while corolla.

Koelreuteria paniculata. A small tree from China, having coarsely toothed pinnate leaves, small yellow flowers and bladdery pods.

Laburnum. A low tree with green bark and large, golden yellow flowers, called also golden chain and bean-trefoil tree.

Lady's Mantle. A rosaceous plant of small, light green flowers.

Lady's Smock. Cuckoo-flower.

Larch. American and European; deciduous; the latter has longer leaves than the American.

Larkspur, the field, erect, showy, azure, dwarf wild, tall, wild and bee.

Laurel, American or Mountain. An ornamental shrub.

Laurel, Cherry, Carolina or Mock Orange. Is a member of the Plum family. Its evergreen leaves are said to be poisonous to cattle. There are two other species from Europe, both evergreen, and planted in the old countries for hedges and screens. Not hardy in the North.

Laurestinus. Arrow-wood.

Lavatera, German. Rose-colored flowers, with long stems.

Lavender. Low under-shrub, producing clusters of small, bluish flowers; barely hardy.

Leadwort. Three species in conservatories but will furnish interesting flowers all summer out of doors.

Leather-Flower. A species of Clematis or virgin's bower, a hardy climber with deep blue, leathery flowers four or five inches broad.

Lemon. In house cultivation sometimes produces the best of fruit.

Lilac. A well known shrub. The Siberian is hardy and of easy culture.

Lily. Most species familiar, as the tiger, Japan, turban, red Turk's-cap, common white, golden-banded, etc. The white day lily is common, having a tawny orange color; the blue day lily is also familiar.

Lily, Blue Water. Bluish, sweet-scented flowers; cultivated in aquaria.

Lily of the Incas. A beautiful amaryllidaceous plant from Peru.

Lily of the Valley. Cultivated everywhere for its small, sweet-scented, white flowers.

Limnanthes Douglasii. An annual ornamental plant from California with very neat flowers.

Loasa. Blumenbachia.

Locust, the Common. An old-fashioned shade-tree which should not be planted north of 39°. The bristly, or rose Acacia, has bristly-tipped leaves and clammy, bristly pods.

Lobelia. Two species of this interesting herb are cultivated in conservatories for ornamental purposes, one under the name of Siphocampylus.

Loblolly Bay. A handsome evergreen shrub; one species, Gordonia pubescens or Franklinia, is deciduous.

Lopezia. A species of evening primrose from Mexico sparingly cultivated.

Lotus, Showy. A large plant of the yellow water lily kind, but has pinkish flowers. Called also sacred bean of India.

Lovage. An old-fashioned tall, sweet, aromatic herb, akin to celery.

Love-Lies-Bleeding. Amaranth.

Lungwort, Smooth or Virginian. Common, growing spontaneously about the yard and old gardens, flowering in early spring; sometimes erroneously called "blue-bells."

Lupine. The yellow has whorls of yellow flowers; the many-leaved is the most common, being a hardy perennial. The varieties have various colors. L. mutabilis, densiflorus, albus and hirsutus are cultivated for ornament. Flower during the summer.

Lychnis. Plants of the Pink family. The ornamental species are the mullein Lychnis or pink, Jupiter's Lychnis, Maltese cross or scarlet Lychnis, large-flowered Lychnis, cuckoo Lychnis, day-blooming and evening-blooming Lychnis. Double-flowering varieties of the three last species are known as ragged robin.

Madwort. Alyssum.

Magnolia. The great-flowering, the small Magnolia, or sweet bay, the cucumber tree, yellow cucumber Magnolia, the great-leaved Magnolia, Yulan, the purple, and M. Soulangeana are the species, most of which are hardy and have conspicuous clusters of flowers.

Mahernia verticillata. Produces a succession of honey-yellow sweet-scented blossoms all winter and spring.

Mahonia, Holly-leaved. A showy shrub three or four feet high, especially gay in the fall.

Mallow. The tree mallow has downy leaves, purple flowers; is a shrub, but not hardy; the curled mallow is like the common mallow, except that it grows five to six feet high; the musk mallow grows one or two feet high and is faintly musk-scented; Malva alcea is very hairy, with the stem leaves parted almost to the base; flowers 1½ to 2 inches broad, and deep rose color.

Mallow, Flowering. Flowers two or three inches broad, rose color, rarely white. Several species of mallow are common weeds.

Mallow, Great Red Rose: see Hibiscus.

Malope. A plant of the Mallows order producing variegated flowers. There are two species.

Malvaviscus. Two species cultivated in hot-houses; they are shrubby plants with showy, scarlet flowers of peculiar appearance, not expanding.

Maple. The sugar and white maples are well known. See Forestry.

Marigold. Garden Marigold is an old fashioned, rather unpleasantly scented flower; the African and French.

which also were once common in the gardens, are of a different genus.

Matrimony Vine. A familiar plant of easy cultivation.

Maurandia. Is a popular plant of the Figwort order.

Mayflower. Trailing arbutus.

Meadow Sweet, Douglas's Spiræa. A spiræa from the Pacific coast like our wild hard-hack, but has longer leaves and deeper pink flowers.

Meadow Sweet, English, is a spiræa with numerous small, yellowish-white scented flowers and little pods twisting spirally.

Mentzelia, Bartonia. Herbs one to two feet high with beautiful, showy flowers; several species.

Mezereum. Daphne.

Mignonette. A celebrated plant producing greenish-white flowers of delicious scent. The dyers' mignonette, or weld, has a long spike of yellowish flowers.

Mimulus, Monkey Flower. Now being multiplied into many varieties.

Mistletoe, American. A celebrated parasite producing greenish flowers and white berries.

Mock Orange, Syringa. The common species has leaves of the taste and smell of cucumbers and handsome clusters of beautiful and odorous cream-white flowers in late spring; the broad-leaved species grows from six to twelve feet high, with pure white and nearly scentless flowers; the scentless mock orange has smaller flowers; the large-flowering has very large, scentless leaves; two other rare species are also sometimes found in cultivation

Molucca Balm, Shell Flower. A hardy plant of the Mint order, rarely cultivated in old gardens.

Moneywort. Is a common herbaceous vine; nice for hanging baskets.

Monkey-flower. Mimulus.

Monkshood: see Wolfsbane.

Morning-glory. Several beautiful varieties.

Moss Pink. A small phlox. See engraving, page 489.

Mountain Ash. The American is the common species; the elder-leaved has larger berries; the European is a good-sized tree, producing berries a half an inch in diameter.

Mulberry, Red. A small tree of exuberant foliage and luscious fruit.

Myrsiphyllum. An asparagus-like plant from the cape of Good Hope; cultivated in conservatories for winter decoration.

Myrtle. The common has a small, white rose-tinged flower, sometimes double; the rose apple has large, white flowers and produces a large edible berry; Guava bears a large and pear-shaped yellowish berry, which is eatable; bottle brush has an interesting arrangement of the flowers around the later leaves.

Nandina domestica is a shrub of the barberry kind with very ornamental berries.

Narcissus. A beautiful little plant of great celebrity; the leaves are narrow, somewhat like grass-leaves; there are several varieties, as the poet's, the two-flowered, the Polyanthus, the jonquil, the daffodil, etc. The jonquil has a small flower and the leaves nearly round and rush-like, and the daffodil has the leaves flat and the flowers large. Hardy.

Nasturtium, Tropæolum, Indian Cress. The common species has large flowers, varying from orange to scarlet and crimson, and there is a double variety; the smaller has paler, yellow flowers; the tuberous has orange-colored blossoms and edible tubers; and the canary-bird flower is of the color indicated by its name.

Nelumbo, Showy Lotus, Sacred Bean of India. White or pinkish flowers, of a rich odor.

Nemophila. A low, spreading plant, several species, mostly from California.

Nepal Cinquefoil. A species of Potentilla from the Himalaya region; flowers rose red, in bloom all summer; another species has much darker-colored flowers.

Nesæa. One species, not hardy; is ornamental.

Nierembergia. A popular plant of the Nightshade order, of which there are many varieties.

Nolana. A low, spreading plant of the Nightshade family from South America, flowering all summer.

Nutmeg Flower. Bluish flowers, spicy seeds, but has coarser leaves and smaller pods than the fennel flower.

Olea or Osmanthus fragrans. Cultivated in greenhouses for the exquisite fragrance of its small flowers.

Oleander. A common house tree; one species is the sweet, and is less cultivated, as it is more tender.

Ompalodes. An ornamental plant of the Borage family.

Orange. Sometimes cultivated by amateurs in the North for curiosity.

Orchis and Habenaria furnish several interesting varities of flowers for amateur culture; mostly hardy.

Orpine, Garden, or Live-forever. Grows two feet high; leaves oval, thick, pale and mostly wavy toothed.

Osage Orange. Beautiful as well as useful.

Oxalis. Several species of this popular plant are cultivated in the house. They belong to the Wood-sorrel family.

Pæony. Of the five species, the white-flowering or fragrant, or Chinese, the tree and paradoxa, there are many varieties. The Chinese pæony has smaller leaves and is often sweet-scented. Florists have made many colors in this popular and well known plant.

Palms. Many genera and species are easy of cultivation in the house during the winter and out-doors in the summer.

Pansy. The most ornamental of all the violets, and well known. All colors and combinations of color are furnished by the florists.

Passion Flower, including Tacsonia and Granadilla, are an interesting class of plants; rarely found in cultivation.

Paulownia. A tree having catalpa-like leaves and large clusters of violet flowers; scarcely hardy.

Pea Tree. A rather hardy shrub, having slender yellow flowers in spring.

Pepperidge. Particularly beautiful in autumn.

Perilla. An animal plant of the Mint family from Eastern Asia, cultivated for its foliage.

Periploca. An ornamental twiner of the Milkweed family; hardy.

Periwinkle. Spreading freely by the creeping sterile stems; flowers in early spring; a nearly hardy evergreen; besides the common species there are the large and the small, which are rare.

Petunia. Multiplied into several varieties of various-colored flowers, etc., by cultivation, most of which are familiar.

Philadelphus: see Mock Orange.

Phlox. Well known in all its species.

Photinia. Three species of this choice ornamental rosaceous shrub are found in cultivation; one, the Loquat tree, from Japan, bears edible yellow fruit, resembling a small apple.

Pimpernel. Anagallis.

Pine. The White, Scotch and Austrian are the most popular species.

Pink. The species are the sweet William or bunch pink, Carthusians', China or Indian, clove or carnation, pheasant's-eye or plumed and Dianthus superbus, each with many interesting varieties and various colors.

Piqueria is a plant from Mexico, blooming in winter; much used for dressing larger cut flowers.

Pitcher-plant. The great, the yellow and the parrot are very interesting plants.

Pomegranate. A small tree cultivated as a house-plant; flowers large and bright scarlet, sometimes full double; fruit as large as a small apple.

Poplar. Silver-leaf and Lombardy are the most popular. See also Tulip-Tree.

Poppy. A well known annual plant of very showy flowers of various colors. The five leading sorts are, the opium, corn, long-headed, oriental and the Mexican prickly; the latter has large, yellowish flowers, one variety being white.

Portulaca. The great-flowered is the well known species, of nearly all colors and variegations.

Prickly Pear. See Cactus.

Pride of India. A splendid flowering tree of the South.

Primrose, Evening. See Evening Primrose.

Primrose, Peerless. A species of narcissus having only two flowers, white, or pale, or straw-colored, and the crown in the form of a short yellow cup.

Prince's Feather. Amaranthus caudatus and Polygonum orientale.

Privet, or Prim. A fancy little semi-evergreen shrub for ornamental hedges.

Queen of the Prairie. A beautiful wild Spiræa; the bruised foliage exhales the odor of sweet birch.

Ragged Lady. See Fennel-Flower.

Ragged Robin. Lychnis.

Ragwort, Purple. An interesting composite flower.

Ranunculus Asiaticus. Yellow, double-flowered, not hardy.

Ranunculus aconitifolius is an interesting plant.

Raspberry. See Bramble.

Red-bud. A small but crooked tree, a native of this country, very beautiful in early spring, presenting a deep crimson top before the leaves appear.

Rhodanthe. An interesting composite from Australia.

Rhododendron, Rose Bay. Shrubs and small trees which have recently been multipled into many gorgeous varieties by the English.

Richardia, or Ethiopian, or Egyptian Calla. A common house plant of the Indian Turnip family.

Rose. Prairie or climbing wild rose is of a deep rose color becoming nearly white; sweet-brier, pink, disposed to climb, fruit pear-shaped; small sweet-brier, a variety of the last; dog rose, like the sweet-brier, but the leaflets are smooth and the flowers three or four together; Cherokee rose, evergreen, disposed to climb high, flowers single, large, pure white; the evergreen or Ayrshire rose of the South is not hardy, flowers white; musk or muscat rose has sweet-scented flowers, not climbing; many-flowered rose, the well known climbing species with small flowers, white, pale red or rose purple; Banksia has violet-scented flowers; India, China, tea, perpetual, Bengal, Bourbon, and Noysette roses and the Bengal Pompons are varieties of one species; French or Provence red rose is pink red and crimson, and used for "conserve of roses," etc.; the hundred-leaved or cabbage rose is full double and of various shades of color; Pompon roses are miniature varieties; moss roses are abnormal states of this species; petals are used for rose-water and essence of roses; damask, etc., rose has greener bark than the last and larger curved prickles, and is used in preference for attar of roses and rose-water; white rose, between the preceding and the dog rose; cinnamon rose, single, like our wild dwarf rose, with brownish red bark; burnet or Scotch rose, only one or two feet high, exceedingly prickly, small early flowers either single or double and of various colors; yellow eglantine rose, somewhat like a sweet-brier but lower, flowers deep yellow, orange or buff and sometimes variegated; yellow rose, having sulphur, full double flowers. There are many varieties of each of the above species.

Rose Acacia. Locust.

Rose Apple. See Myrtle.

Rose Bay. One of the Rhododendrons.

Rose of China. Hibiscus.

Rose of Sharon. Known also as Althea, or August flower.

Rudbeckia, Coneflower. Several interesting varieties of this hardy, gorgeous composite are being introduced.

Rue. An old-fashioned, heavy-scented, hardy, perennial herb.

Sacred Bean of India, lotus.

Sage. Common, Mexican, Scarlet, etc.; flowers of some are red, some blue and some white; some of the plants are annual and some perennial.

Salpiglossus. A conservatory shrub of the Figwort order blooming during the summer.

Sassafras. Can be made highly ornamental.

Satin Flower. Honesty.

Saxifrage. The thick-leaved is evergreen and bears bright rose-colored flowers; beefsteak saxifrage, or strawberry geranium is not quite hardy, has strawberry-like runners and its flowers are irregular and variegated.

Schizanthus. Handsome flowers having a cut appearance: many varieties.

Sedum carneum or variegatum. Is cultivated for borders; has creeping stems and small leaves; rare. For other varieties of Sedum see Stonecrop.

Sensitive Plant. Abundant in Missouri; but other and more remarkable specimens are found in the conservatories.

Shell-Flower. Molucca balm.

Shrubby Althea. Hibiscus.

Sida Napæa. A plant of the Mallows order sparingly cultivated in old gardens.

Silver-berry. An intetesting plant from the far West worthy of introduction.

Skimmia Japonica. A hardy, smooth shrub, with entire and bright evergreen leaves, crowded on the ends of the branches, which in the spring are terminated with a close cluster of small, white, sweet-scented flowers, followed by bright red berries, lasting over winter. This plant is comparatively new in cultivation in America.

Smoke-Tree, Venetian Sumac. Bears large fringes, appearing at a distance somewhat like smoke. Sometimes also called "fringe tree." Belongs to the Sumac family.

Snail-flower. A twining herb from a tuberous root; flowers showy, white and purple, two inches long, and has a coil like a snail-shell.

Snail Medick. Occasionally cultivated for its curious pods, which are coiled like a snail-shell. Called also "beehive."

Snapdragon. A familiar but interesting flower.

Snow-ball. Hardy and universal.

Snowberry, has globular white berries in autumn.

Snowdrop Tree, or Halesia. A tree of beautiful flowers. For engraving, see Landscape Gardening.

Snowdrop. A delicate white flower in early spring, of the Amaryllis order; there is a double variety.

Snowflake. A flower of the Amaryllis order like large snowflakes.

Sophora, Japan. A pod-bearing tree twenty to thirty feet high, with greenish-bark and locust-like leaves and loose clusters of cream-white flowers in mid-summer.

Southern-wood. A very fragrant, well known shrub.

Spanish bayonet. Bear grass.

Spindle-Tree. See Burning-Bush.

Spiræa. The species callosa or Fortunei is a shrub three to six feet high, bearing clusters of deep pink flowers; æriæfolia is a tall shrub from Oregon with small yellowish-white flowers; Bella is a low shrub with rose-pink flowers; chamædrifolia is a low spreading bush with clusters of small flowers; trilobata is a spreading smooth bush with showy flowers; lanceolata or Reevesiana, from China, has showy blossoms; prunifolia is a slender shrub with full double, pure white blossoms one-third of an inch in diameter, in great abundance; sorbifolia, from Siberia, is very hardy, three to four feet high with pinnate leaves and clusters of white flowers. For the other species of Spiræa, see respective English names. See engravings, pages 484 and 487.

Spoonwood. A species of laurel.

Spruce. The Norway, hemlock, white, black or double, the silver and the balsam fir are all very fine ornamental evergreen trees.

Spurge. Euphorbia.

Stapelia. A strange-looking, fleshy plant from the Cape of Good Hope; in conservatory generally with Cactuses; flower three to four inches wide, dull purple and yellowish.

Star Anise. An aromatic shrub of the Magnolia order, with oblong evergreen leaves. The Illicium anisatum yields the oil of anise. The wild anise tree of Florida has larger dark purple flowers of 20 to 30 narrow petals, in early spring.

Star-of-Bethlehem, Ten-o'Clock. Leaves long and grass-like, flowers bright red within and green outside.

Statice. The latifolia has a luxuriant foliage, large trusses of lilac flowers, very fine for bouquets when dried. For picture, see page 487.

Stephanotis. A fine hot-house climber of the Milkweed order.

St. James' Lily. Jacobæan Lily.

St. Peter's Wreath. Italian May.

Stonecrop. The mossy stonecrop or wall pepper is cultivated for edging and rock work; it is a moss-like little plant forming mats on the ground and bearing yellowish green and yellow flowers; the beautiful stonecrop has rose-purple flowers and crowded leaves.

Sundew. There are several species of this curious perennial plant. The flowers are small, white or rose purple, opening but once, and that in the sunshine. A dew-like drop of liquid appears upon the bristles of the leaves, which catches small flies. Plant grows in bogs.

Sunflower. Besides the common species an interesting variety from Texas is cultivated for its hoary white foliage.

Sweet Cicely. Two American and one European species are hardy.

Sweet Clover. Remarkable for its sweet scent while drying.

Sweet-scented Shrub. See Allspice.

Sweet Sultana, Amberboi. A hardy herb of the star-thistle genus. A species is the musk-scented.

Tamarisk, French. A picturesque, delicate, nearly evergreen shrub, barely hardy and somewhat cypress-like in aspect.

Tassel-flower. A summer annual bearing beautiful tassels at the summit.

Thorn, Hawthorn. The evergreen English hawthorn, the parsley-leaved thorn, the double scarlet, and some other varieties are sometimes but rarely cultivated for ornament.

Thrift. A species of leadwort three to six inches high, cultivated for edgings, etc.

Thunbergia. A cultivated annual with flowers of various colors.

Thyme. Woody-stemmed, sweet, aromatic plant with small flowers; more cultivated formerly.

Tiger-flower. A summer-flowering plant of the Iris family; has showy flowers five or six inches across, yellow or orange red, the dark center of the petal being spotted crimson or purple.

Toad-flax. One species with long-spurred flowers, violet and purple striped, and one is a little, delicate, ornamental plant.

Torenia. A handsome hot-house plant of the Figwort family from India.

Touch-Me-Not. See Balsam.

Tradescantia. One species from Europe is kept in conservatories; belongs to the Spiderwort family.

Trailing Arbutus, Ground Laurel, Mayflower. An exceedingly fragrant flower appearing in very early spring on a trailing shrub.

Tree of Heaven. Ailantus.

Tritoma. A lily plant yielding very showy flowers in autumn.

Tropæolum. Nasturtium.

Trumpet Flower, Bignonia. Foreign climbers, climbing by their leaf tendrils.

Trumpet-Leaf, Red-flowered. A species of pitcher-plant with crimson purple flowers.

Tuberose (pronounced tu′-ber-ose). A plant of the Amaryllis family growing from tubers and bearing a deliciously fragrant white flower, slightly tinged with rose; choicest sorts full double; a perennial herb.

Tulip. Well known; scores of varieties.

Tulip-Tree, White-wood, Poplar. A tall tree with showy flowers, which are yellow, with greenish and orange; leaves with two short side lobes and the end seems as if cut squarely off. The wood is popular for boxing.

Unicorn Plant. Cultivated to a small extent both for curiosity and for its fruit, used in conserves. A sweet-scented species from Mexico is better.

Venetian Sumac. Smoke-Tree.

Verbena. Next to Geranium in universality.

Vine Bower. A species of Clematis or virgin's bower; is a hardy climber, with blue or purple flowers.

Viper's Bugloss. An old-fashioned plant of the Borage family now abundant as a weed.

Virginia Creeper. The most common vine of the woods; sometimes trained about houses and fences for ornamental purposes. Called also American Ivy. Has five leaflets to each leaf. Poison ivy has but three leaflets to the leaf.

Virgin's Bower, Common. One of the most common vines of the woods, having three leaflets to the leaf and many rootlets the whole length of the vine; is sometimes trained around houses and fences.

Virgin's Bower, Upright. Nearly erect.

Virgin's Bower, Sweet-scented. A free climber.

Waahoo. Burning-bush.

Wallflower. A much prized house plant; has narrow, pointed leaves and the flowers are orange, brown reddish or yellow. The western species has toothed and hoary leaves.

Wall Pepper. See Stonecrop.

Wax-Plant, Hoya. A shrubby house plant from India with flesh-colored flowers, the upper surface of which is covered with minute pimples.

Wayfaring Tree. A species of snowball but seldom cultivated.

Weigela. A hardy shrub of easy culture.

White-wood. Tulip-Tree.

Willow. Several species planted for hedges and borders, especially along sloughs; the white is the most common.

Wistaria. The American has showy, blue-purple flowers, and is hardy; the Chinese climbs higher, has longer and more abundant clusters of flowers, and often blooms twice in the season; scarcely hardy.

Wolf's-bane, Aconite or Monk's-hood. Showy and interesting flowers shaped somewhat like a hood; the four species are the wild, the variegated, the officinal and Aconitum anthora.

Woodbine. Honeysuckle.

Wormwood. A common, old-fashioned medical and ornamental shrub.

Ximinesia. A composite from Mexico, two feet high, with showy bright yellow flowers; highly ornamental.

Yam, Chinese. See Chinese yam.

Yellow Wood. One of the very neatest and handsomest ornamental trees; wood light yellow, and bark close like beech, and leaves compound like the locust; flowers pretty, delicately fragrant, cream white, which appear in May or June. Native of East Kentucky.

Yucca. Bear-grass.

Yulan. Magnolia.

Zauschneria Californica. Is a plant of the Evening Primrose family bearing handsome scarlet flowers in late summer and autumn; grows one to two feet high.

Zinnia. A popular compound flower from Mexico, blooming all summer.

See also Flowers.

Flour, the farina of the grain of wheat, barley, rye, or other grain separated from the husk and reduced to a state of fine powder. Flour of wheat is now divided into many grades, fine, superfine, family flour and extra being the principal grades. Formerly the word "flour" applied only to the flour of wheat, that of rye and buckwheat being denominated meal, but now the word is used for all the better grades of ground bread grains, except Indian corn. Good white flour has the following characteristics: It is white, with rather a yellowish, instead of bluish, tint; absorbs a good deal of water, and when wet a little and worked between the fingers it does not grow sticky; a little of the dry flour thrown against a smooth surface tends to remain in a little heap, while poor flour completely scatters out like powder; or, squeezed together between the finger and thumb, it tends to retain the shape given it, instead of falling away like dry powder. Very little adulteration of flour is carried on in this country, and when one is so unprincipled as to undertake it, he generally uses the flour of the cheaper grains, and of peas, beans, and bones, and terra alba, China clay, silicate of alumina, mineral white, or hydrated sulphate of lime, alum and carbonate of soda. "Self-raising" flour is coming into use. Of course this is necessarily drugged to some extent, and advantage is taken of the occasion to doctor up poor flour. Knowing the *penchant* of the people for *white* flour, the dealers, and especially the bakers, do not hesitate to make it "white" for them, while it is well known among manufacturers and physiologists that the most healthful is necessarily a little dark, from the gluten next the bran.

GRAHAM FLOUR at the present day, is not understood to be merely branny flour, but that which contains the rich, glutinous portion of the grain, and hence is of a dark color. While it is difficult for millers to disguise the bad quality of poor wheat in graham flour, cracked wheat, etc., it is also difficult to obtain a good article in this line, as very few have learned how to make it well. Nor will it keep as long as the less highly organized white flour. To manufacture graham flour it requires sharper stones and a lower degree of temperature; and any dirt or mustiness in the grain ground is more perceptible in the product than in the "bolted," "fine," or "white" flour. The extra patience and skill required for this manufacture deters millers from the undertaking unless they can obtain a correspondingly greater price for their work. This flour is more popular in cities, especially among the wealthy and those of sedentary habits, than in the country; and when the world shall have paid as much attention to the preparation of palatable and healthful graham bread, cakes, puddings, etc., as it has to white flour, the latter will probably go out of use.

SELF-RAISING FLOUR is made thus: Mix well together 3 pounds of carbonate of magnesia, 28 pounds of tartaric acid, 112 pounds of potato flour and 12 ounces of turmeric, all perfectly dry; add 4 pounds of this mixture to every 100 pounds of the flour, stirring thoroughly. Keep perfectly dry, and when wetted for use it must be baked immediately. Or,—

PREPARED FLOUR. Take 1 package of Horsford's Bread Preparation and sift it into 25 pounds of flour, and set it aside in a covered box, to use for biscuit, cake, fruit-roll, pot-pies, fruit short-cakes, and puddings. Can be mixed with either water or sweet or sour milk.

TO PREVENT FLOUR FROM SOURING. Take out from the barrel or sack a small quantity of the flour, say 25 or 30 pounds, or a little more if you can conveniently do so, loosen the remaining portion so as to make it quite light in the barrel or sack, and keep in a dry apartment. Compactness and moisture are the only causes of souring.

TO BROWN FLOUR. Put some flour in a pan or dish and set it in the oven or over the fire. Stir it about that it may not burn; but let it brown well. Keep it in a dredging box for browning ordinary gravies.

Flower, the reproductive organ of a flowering plant. All flowers are temporary, and some are exceedingly short-lived; yet they aggregately constitute the chief glory of the vegetable creation; and multitudes are superlatively interesting for the delicacy of their organization, the elegance of their forms and the brilliancy or beauty of their tints. They are by far the most refined portion of plants, and possess a mighty power to arouse the curiosity, to excite the admiration, to charm the fancy, and to thrill and to fascinate our sense of the beautiful; and so completely do many of them fill the imagination of all beholders as popularly to give their names to the entire plants on which they grow. "A love of these beautiful things of nature," says the most distinguished female poet of America, "has been sometimes assumed as a criterion of the health of the mind. Those who are under the habitual influence of evil tempers do not approximate to the spirit and language of flowers. In vain do they reach forth their sweet, clustering blossoms; envy, hatred, and malice are beyond the reach of such charmers, 'charm they never so wisely.' But he who, amid the care and weariness of life, finds daily an interval or a disposition to commune with the dew-fed children of heaven, to devise their welfare, and shelter their purity, has not yet been injured by the fever of political life, the palsy of the heart or the eating gangrene of the inordinate desire of riches. Err they not, therefore, who consider a taste for the charms of nature a waste of time? The railroad machinery of a jarring world, bridging its abysses, and tunneling the rocks of political ambition, her steamboats, rushing to the thousand marts of wealth, silence, with their roaring funnels, its still, small voice. But let it be heard by those who meditate at eventide, when the rose closes its sweet lips, and the tired babe is lulled on the breast of its mother. Let it be a companion to those who, in the morning prime, walk forth amid the dewy fields loving the beauty of the lily which Omnipotence stooped to clothe, and from whose bosom, as from the scroll of heaven, the Redeemer of man taught listening multitudes the lesson of a living light."

Some flowers issue from the roots of the plants which produce them; some from the stem; and some from the leaves; but the majority issue from the extremity of the branches.

The colors of some species of flowers are uniform and unalterable, those of others usually possess two or more invariable tints, or sets of tints, constituting so many varieties of the species; and those of a few, particularly of some species of the brilliant and pet beauties technically called florists' flowers, are exceedingly numerous, and often wonderfully variable and sportive. Species of different colors, even when all are invariable, occur, in multitudes of instances, in the same genus. The mere color of flowers, therefore, seldom possesses the rank of a botanical character, so as to afford to the learner any criterion of genera or species. The elaboration of the various colors and tints must constitute one of the most complex and beautiful of the processes of natural chemistry; but it proceeds on too filmy a scale, and under too recondite conditions, to have been hitherto detected by the researches of chemical phytology. The tints of some flowers, as may be familiarly seen in many hybrid violets, fade or change on the plant under the play of sunshine; and those of many either pass into other tints or wholly perish, soon after the flowers are cut or gathered.

Double flowers are such as have a duplicature, triplicature, or multiplicity of their normal petals; and thoroughly double flowers, such as those of the best kinds of dahlias, roses, camellias, ranunculuses, carnations, pinks, stocks, wallflowers, hepaticas, rockets, polyanthuses, and other species of the choicest flowers, possess an absolute profusion of petals, and exhibit them from center to circumference of all their natural space. All doubleness is supposed to result from an excess of nourishment and warmth, or from a profuse luxuriance and plethoric energy of growth in the plants at the time of flowering; and it is always accompanied, in its fullest and middle-rate forms, with a want of pistils and stamens, the parts of the flower essential to natural or seminal reproduction, and is, therefore, regarded by botanists as a monstrosity. In all such perennial plants as are propagable by offsets, division of the roots, tubers, cuttings, layers, or buddings, the habit of double-flowering is, in all ordinary circumstances, conveyed into the young plants by these methods, so as to be quite certain of development, but in plants which are propagated by seeds, whether they be annual, biennial, or perennial, it is conveyed only by the same kind of recondite agencies which originated it, and is always contingent and doubtful of development.

A notion prevails that seed from a plant which has grown by the side of a double-flowered plant possesses a superior power of producing a double-flowered habit; but this is mere fancy. Sound, plump, properly ripened seed, no matter how grown, is no doubt one condition of eminent success in producing double-flowering plants, and the other conditions are the particular circumstances of soil, climate and culture, be they what they may, which induce extraordinary vigor and luxuriance in vegetation, particularly at the period of the formation and development of the flower buds.

Flowers, Arrangement of. Consider, first the vase. Bright-colored vases are not as effective as white, brown, Swiss wood, silver or bronze; all will readily see, if the vase is green or blue, the color conflicts with the foliage in the bouquet; if pink or red, with the flowers. A bowl or broad open vase seems the most appropriate shape for roses. A tall, spreading vase, for gladiolus, ferns, tuberoses, etc.; flat glass dishes, or cups, for violets and early wild flowers. "A flower lover will in time collect shapes and sizes to suit each group." Assort your flowers according to size and color, and arrange them mentally. Before beginning, put the whole mind upon the work and harmonize the colors perfectly, using green to separate the flowers.

In arranging flowers in a bouquet, do not crowd them; let each flower show its individual beauty, and a fine effect can be produced with comparatively few flowers. We often see bouquets where fine flowers are used extravagantly, that are not pleasing because of their crowded appearance. The art of arranging bouquets is very simple, if any one possesses a good eye for color, and has some idea of tasteful combination. Care should be taken to harmonize and blend the colors together, using white, neutral tints and green; nature says plenty of green. Each flower is beautiful in itself, but when you group sun-flowers and roses, pansies and marigolds together, the charm of each blossom is lost. We often see at our agricultural fairs, bouquets of this kind utterly devoid of beauty, that are literally packed with beautiful flowers. We long to see in their places something simple, like a handful of nasturtiums, pinks, or a single flower with its buds and leaves. In arranging flowers, avoid stiffness; let the bright fern or fresh, fine grass break forth now and then, and the delicate vine wander about in its pristine beauty.

In arranging hand bouquets, begin at the center with roses or something rare and beautiful, always placing the brightest colors in the center of your bouquet, and gradually decreasing the intensity of the tints as you approach the exterior; mingle shades and colors, but do not put one where it can detract from another, for instance, crimson and scarlet, unless flowers are very scarce; but if obliged to use them together, put plenty of white and green between them. Blue and yellow will not satisfy the eye, unless brightened by red or pink; pink, pale blue, or light purple harmonize well. The color and shape of the green is a valuable adjunct in making all symmetrical; that must also be carefully studied. The lace-figured paper makes a fine finish for hand bouquets. In arranging baskets, begin at the outer edge. Drooping flowers and vines, and nearly all kinds of garden flowers, look well in baskets.

Bouquets for the dining-table are usually made rather low. The custom of making bouquets as high as the heads of the guests at the table, is happily passing away. The custom of putting a small fragrant bouquet of rose-buds, pansies, heliotrope, geranium leaves, etc., in the napkin, is a charming one. Large rooms, with high ceilings, will admit of very high, showy bouquets. We once saw, against a very white wall, upon a corner bracket, a huge vase filled with broad, green leaves, long, drooping lily or corn-leaves, several ferns more than three feet long, a few plumes of grasses, one or two spikes of hollyhocks, gladiolus, large zinnias, and dahlias, and cut with very long stems, that gave us great delight. The foliage, from a little distance, reminded one of the tropics. Bright green, feathery ferns, and trailing vines, with a few bright flowers, are used in profusion in decorating our houses. Ferns were never in such demand as at the present time.

We do not half appreciate the importance of bringing flowers into our school-rooms. They are many times to the mind what exercise is to the body; a bright bouquet, a mound of fresh, green moss from the woods, or a healthy, blooming plant, will refresh the tired mind of the student, and enable him to renew the tedious lesson with new life and willing heart; will give the weary teachers rest and comfort. We will take a short extract from a note written by a model teacher to a lady who occasionally sent her a bouquet. "One bouquet you sent me last winter will ever be fresh in my memory. There was nothing cheerful in the school-room, not even a map; the school was large; some very large pupils to get along with, and thinking I had such a large school, made it harder. I went into school one day greatly discouraged; your daughter came and gave me a bouquet. I knew not what to say or how to thank her. It awakened my better self; the tears would flow. A day never passed after that that I did not try to say something cheerful to them." Who can say after reading this testimonial that flowers have no influence in the school-room? And what influence, too, they have in church! For these purposes flowers are used more and more every year.

Bouquets may be kept a month in continuous blooming (of course, with a proper selection of continuous bloomers), by sprinkling with fresh water, and placing them in water containing some soap-suds. Take them out each morning and lay them in fresh water a minute or two, and replace them. Change the soap-suds twice a week.

CUT FLOWERS. Flowers decay much sooner when tied in bunches than when arranged loosely. Too little air and too much water are the bane of most species. The moisture furnished cut flowers should be rain-water of a moderate temperature. When gathering flowers use a pair of sharp shears, or a knife for woody plants, such as roses, Camellias, spiræas, Deutzias, Fuchsias and the like. It is far better to gather your flowers than to let them fade upon the plants. A cool room is best adapted for keeping flowers fresh; stale tobacco smoke will wilt flowers. Take away each flower as it fades, or it will destroy others. Hot water will often restore flowers to freshness, even when every petal is drooping. Place the stems in a cup of boiling hot water; let them remain until each petal has become smoothed out, then cut off the coddled ends and place them in water of moderate temperature. Ammonia added to the water also revives them quickly. A good way to keep cut flowers fresh is to lay them in wet cloths. Take them out of the vases at night, sprinkle with cold water, and then wrap them in cloths made very wet with cold water. The weight of the cloth will not crush the most delicate flower, while it keeps out the air and prevents their falling to pieces or opening farther. When you receive a bouquet, sprinkle it lightly with fresh water; then put it into a vessel containing some soap-suds, which nourish the roots and keep the flowers as good as new. Take the bouquet out of the suds every morning, and lay it sidewise in fresh water, the stock entering first into the water; keep it there a minute or two, then take it out, and sprinkle the flowers lightly by the hand with pure water. Replace the bouquet in the soap-suds and the flowers will bloom as fresh as when gathered. The soap-suds need to be changed every third day. A small quantity of nitrate of soda put into the water every time it is changed, will preserve cut flowers a fortnight or more. If you wish your flowers to remain fresh a long time (and who does not), cut them eaily in the morning while the dew is still upon them; cut them with sharp scissors or knife, and remove unnecessary leaves; as soon as cut, drop them into a basket or tray. Do not touch them with the hands more than is necessary. In cutting roses, cut buds or half-blown ones; place them as soon as gathered in shallow tins or bowls in a dark cellar or cool place, until you wish to arrange them. They should be arranged two hours, at least, before wanted. A little water sprinkled finely over them sometimes improves fresh flowers, but rarely; it improves flowers beginning to decay. Flowers decay sooner when tied in clusters or bouquets than when arranged loosely. When ready for the table, place them in the vase, or dish, with cold, soft water, add a few drops of saltpeter, carbonate of soda, ammonia, salt, camphor, or bits of charcoal; give plenty of fresh air, particularly at night. Some flowers, like the Archenia, Azalea, Rhododendron, have a way of dropping their petals just as they are most wanted. Florists let a drop of gum Arabic fall into the center of the flower, where it hardens at the base and fastens them tightly to the stigma. In cutting flowers, if you wish to avoid cutting unnecessary buds, cut the flower stem short, and tie with yarn to broom-corn; put a little cotton between the stems and splint to preserve moisture.

PLANTS IN SLEEPING ROOMS. So far from plants being injurious when placed in sleeping rooms, it has been proved that they are actually conducive to health; they are actual and perfect "atomizers," and have a material influence on the humidity of the air in which they are kept. Experiments made by means of the hygrometer show conclusively that house plants may properly be classed as therapeutic agents. As to their unwholesomeness because of giving off carbonic acid gas at night, it has been shown by experiment that it would require 20 thrifty plants to produce an amount of the gas equivalent to that exhaled by one baby sleeper. A practical application of the data gained by experiment is given in the carefully prepared formula: Given a room 20 feet long, 12 feet wide, and ceiling 12 feet high, warmed by dry air, a dozen thrifty plants with soft, thin leaves and a leaf surface of six feet square each, would, if well-watered and so situated as to receive the direct rays of the sun (preferably the morning sun) for at least several hours, raise the proportion of aqueous vapor to about the health standard. It is evident, then, that the air of a room is kept moist by thrifty plants.

Cut flowers are a fruitful source of malaria in rooms, not from the odor from the flowers, but from stagnant water or decaying vegetable tissues in the vessels containing the flowers. Putting a little charcoal in the water will keep it sweet longer; but the only sure remedy for putridity is frequent changing of the water.

To Preserve Flowers. Gather them before too ripe or ready to fall; take the most perfect and beautiful and dip them in melted (not hot) paraffine; move them about a little, so as to let the air escape and all parts of the flower become coated. They will soon dry and may be framed under glass. Another way is to crystallize them by dipping in a solution of alum (alum, 1 pound; rain-water, 1 quart); a few dippings will coat them nicely. For winter blooming, select the most perfect buds of such flowers that are latest in in bloom. Just before they are ready to bloom, cut them off with a pair of scissors, leaving the stem three or four inches long. Do not bruise the stem; immediately seal the cut end with Spanish wax. Lay them in a cool, dry room. As soon as they shrink a little wrap each one separately in clean, white paper. Lock them in a drawer where nothing can injure them. When you want flowers take them out, cut off the waxed end, put in a vase or dish of cool water in which a little niter has been dissolved. Set them in a warmish room and in 10 or 12 hours your flowers will open as nicely as if on the bush.

The best thing to change the color of flowers is a liberal supply of charcoal from the stove pounded up and put around the roots.

To Restore Faded Flowers, immerse them halfway up their stems in very hot water, and let them remain there until the water cools or they have recovered their color; then take them out, cut off the cooked portion of the stems and place the flowers in clean, cold water. Some of the more delicate kinds cannot be restored in this way.

To Hasten Blooming, dissolve together 4 ounces sulphate or nitrate of ammonia, 2 ounces nitrate of potash, 1 ounce sugar, in 1 pint of water. Keep in a well-corked bottle. For use, put 8 or 10 drops of this liquid into the water of the jar or vase, and change the water every 10 or 12 days. For plants in pots, a few drops must be added to the water employed to moisten them.

To Preserve Flowers for Perfumery, pack them tight with one-fourth their weight of salt in bottles, jars, or casks. In this way they may be preserved for two or three years. Both flowers and salt should be perfectly dry. The salt should be dried in an oven.

For culture and variety of flowers, see Floriculture, pages 480 to 499.

Flue, an air passage, especially one for conveying smoke and flame from a fire; a tube in a steam boiler.

Fluke-worm, a worm sometimes found in the livers of sheep, particular when they are affected with the rot.

Flush, in hunting, is to frighten a bird out of its cover unintentionally.

Fly-wheel, a wheel with a heavy rim, for retaining inertia and equalizing the motion of machinery. The simplest of all contrivances for regulating machinery are fly-wheels, which are nothing more than large heavy wheels driven with great velocity by the machinery to which they are attached.

Foal, a colt or horse fœtus; also, to give birth to a colt.

Fodder, the bulky, vegetable food of domestic animals, and particularly of cattle. It does not properly include any kind of food which contains nutritious matter in a concentrated form, but it includes all bulky kinds of food, whether green or dry, which either act principally as ballast or nourishment. How to raise and take care of these various crops is described under their respective heads. See also Ensilage and Soiling.

Fog. There is a constant ascent of watery particles from the surface of the earth, occasioned by the evaporation from masses of water and moist bodies. Part of the water which rises in vapor is intimately united with the atmospheric air, which holds it in solution. This portion of aqueous matter is invisible, and exists in the greatest quantity in very warm and serene weather. Thus, in the hot days of summer, any cold body (as a vessel filled with ice water) is immediately covered with little globules of water, which are the vapor of the atmosphere precipitated. But when the air is saturated, the watery particles which continue to rise are no longer dissolved, but remain suspended in vesicular vapors, which form clouds when they rise to a great height, and fogs when they hover near the surface of the earth. Fogs are more frequent in those seasons of the year when there is a considerable difference of temperature in the different parts of the day; as, for instance, in autumn, when, in the warmest part of the day, the air is capable of holding a great quantity of aqueous matter in solution, which on cooling, towards evening, it is no longer capable of dissolving. In hot weather the air is not so easily saturated, and in cold weather the process of evaporation is very slow, so that in these cases fogs are less common. In low, moist places, and in confined places, as valleys, forests, bays, or lakes, surrounded by high lands, they are much more prevalent than open countries, or elevated spots where they are quickly dispersed by the winds. There is another atmospherical phenomenon, which has been called dry fogs. In 1783 all Europe was enveloped with a dry fog, at the moment of a simultaneous volcanic action in Iceland and Calabria. In 1755, before the earthquake which destroyed Lisbon, a similar fog overspread the Tyrol and Switzerland. It appeared to be composed of earthy particles reduced to an extreme degree of fineness.

Foliage, the collective or aggregate leaves of a tree, a shrub, or an herb. A foliage crop is one whose leaves alone are available, and which requires to be used green, and cannot be made into hay. All the cabbages and kale, for example, are foliage crops.

Following Cattle: said of hogs, which follow cattle to obtain the undigested grains of corn that pass through with their droppings.

Foment, to apply hot water, or cloths wrung from hot water, to a part of the body, to reduce pain and create muscular relaxation. Many poultices and other applications also foment to some extent, besides producing other effects. Blistering and any other irritation of the skin have similar effects, with complications. India-rubber bags can now be had at most drug stores, which can be filled with hot water, screwed up tight, and safely used in bed; one can lie upon them without any danger of bursting them. They constitute by far the most convenient method of applying fomentations.

In cases of sprains or other affections where heat has to be applied, pieces of thick flannel are used dipped into the hot liquid, and applied one after the other. In colic, obstinate cases of constipation, and other affections of the bowels, hot fomentations are recommended. They are also used in cases of gout and quinsy, when it is necessary to bring the tumor to a suppuration. An excellent fomentation to relieve acute pain is composed of white poppy heads and ½ an ounce of elder flowers boiled in ¾ of a pint of water until the latter is reduced to a quart. In cases of dysentery, flatulent colic, retchings to vomit, an aromatic fomentation may be employed, made with ½ an ounce of black pepper in red wine. A strengthening fomentation for application to weak parts may be composed of oak bark, 1 ounce; pomegranate peel, ½ an ounce; alum, 2 drachms; and of water in which a red-hot iron has been thrust until it gives the water a strong taste, 3 pints. The bark and peel must be boiled in the water until the quantity has evaporated ⅓, after which it must be strained and the alum dissolved in it. Cold fomentations are useful in sprains before inflammation has subsided. The best way of applying them is that of putting a thick bandage upon the part, and continually pouring cold water upon it.

Food, substances which yield nutriment to plant or animal. Proper food for man or the lower animals contains no deleterious substance to prevent the assimilation of the proximate elements into tissue. The digestive system rebels against the introduction of articles not needed for the welfare of the body, and endeavors to cast them out; some by emesis (vomiting), some by purgation, some by the urinary system, some by perspiration, and some by eruptions. Hence, on these principles, medicines are classed as emetics, purgatives, diuretics, diaphoretics, etc.

The system, however, is not able to expel all the improper elements. A portion of them is laid away, as it were, on the shelves of the vital domain, that is, in the recesses of the animal economy, for an indefinite length of time. If too much of such material becomes stored up, the vital forces, on some exposure to extreme temperature, exhaustion by over-work or other intemperance, commence a revolutionary action to expel some or all of them. This is the *rationale* of fever, indeed of all disease. Failure in such an effort is death.

In studying tables of the elements of food, of their digestibility, etc., one must remember that an article may be three-fourths or more nutriment, and yet, on account of poisonous or repulsive matter present, be unusable by the animal system, as for example, buckeye. Not a particle of the nutriment in such substances can be utilized: nature rejects all. On the other hand, only five per cent. of an article may be nutriment according to the tables (which are constructed from chemical analyses), and yet, there being no inimical substance present, the animal system appropriates the whole five per cent.; for example, apples, turnips.

The digestibility of a given article of food is no index to its utility. Beans, for example, which require three or four hours for stomachic digestion, may be better, in every sense of the word, for a person in health, than oysters, which would get out of the stomach in one hour. The stomach, as well as the other organs of the system, require a certain amount of exercise to keep it strong.

The foregoing principles are essential and universal throughout the domain of human and animal physiology.

Nature appears to be extremely jealous of admitting nutriment of baneful qualities into the blood vessels, and even into the stomach. If food be putrid or putrescent, or, in other words, deficient in organic principles (animal or vegetable) the stomach refuses it; and if it finds its way there, the most violent nausea and vomiting ensue, till the deleterious matter is ejected. But if, notwithstanding the vigilance of nature, the contaminated food passes out of the stomach into the lower bowels, the gall-bladder contracts and pours out a large portion of the bile, to facilitate the escape of pernicious ingredients; and if, notwithstanding all those efforts of nature, a portion only of the putrescent food arrives at the mouths of the vessels which take up the digested food, instead of receiving it, they become inflamed, swelled, and consequently shut up against its intrusion. The glands also which occur in the course of these vessels become swollen and obstruct the vessels by their pressure. If these inflammations are not sufficient to keep out the improper nutriment, a general fever results.

To fully understand the table on the next page, observe the following facts: The amount of water in a substance is found by thoroughly drying it and noting the difference in weight. About nine-tenths of the substance of fruits, melons, roots, and green fodder, is water, but is such water as is more usable by the vital forces than common water from other sources. Hay, dry fodder, wheat, corn, and all the other seeds, consist of about one-tenth water, unless thoroughly dried in a hot oven. To find the amount of mineral, or ash, the article is burned. The albuminoids, called also protein compounds, are flesh-formers, and comprise the nitrogenous elements termed casein, gluten, gelatin, fibrin, etc. On the other hand, the non-nitrogenous elements, or carbo-hydrates, are the heat-formers, namely, fat, starch, sugar and woody fiber (cellulose). The values of the grains, fruits and roots for man varies but little from the figures here given.

TABLE OF FOOD VALUES (STOCK FEED).

			Total Organic Substance.				Digestible Substance.			
Articles of Food.	Water.	Ash (mineral).	Albuminoids.	Woody fiber.	Other carbohydrates.	Fats.	Albuminoids.	Carbohydrates.	Fats.	Nutritive ratio.
Grains and Fruits.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	as 1 to
Apples	83	½	½	4	12		0	13		43
Barley	14	2	10	7	64	2	8	59	5	6
Barley feed	10	4	13	7	63	3	10	57	2	6
Beans, field	14	3	25	9	46	2	23	50	1	2
Buckwheat	14	2	9	15	59	1	7	47	1	7
Corn	14	1	10	5	62	6	8	61	5	9
Corn, New England yellow, ground	13	1	10	2	75	4	8	67	3	9
Corn, Western yellow ground	13	1	9	2	72	3	7	68	2	10
Corn, Southern white	13	1	10	2	71	3	8	68	2	9
Corn, sweet	11	2	11	4	64	8	10	17	6	8
Cotton seed	8	8	23	16	15	30	17	15	27	
Hemp seed	12	4	16	12	21	34	12	16	30	
Linseed (flax-seed)	12	3	20	7	20	37	17	19	35	
Oats	14	3	12	9	56	6	9	43	5	6
Oats, No. 1 white	11	3	11	12	53	5	9	43	4	6
Peas	14	2	22	6	52	2	20	54	2	3
Pears	83	⅜	⅜	4	12		0	13		43
Pumpkins	89	1	1	3	6	0	⅜	7	0	18
Rape seed	12	4	19	10	12	42	15	10	40	
Rice	14	⅔	8	2	75	⅜	7	73	0	11
Rye	14	1	11	3	67	2	10	63	2	7
Wheat	14	2	13	3	66	1	12	64	1	6
Roots and Tubers.										
Artichoke, Jerusalem	80	1	2	1	15	0	2	17	0	9
Beets, fodder	88	1	1	1	9	0	1	10	0	9
Beets, sugar	81	1	1	1	15	0	1	17	0	17
Carrots	85	1	1	2	11	0	1	12	0	9
Parsnips	88	1	2	1	10	0	2	11	0	7
Potatoes, Irish	75	1	2	1	21	0	2	22	0	11
Rutabagas	87	1	1	1	9	0	1	10	0	8
Turnips, common white	92	1	1	1	5	0	1	6	0	6
Hay.										
Clover, Alsike or Swedish	16	6	15	27	33	3	9	35	2	5
Clover, lucerne, medium	16	6	14	33	28	2	9	28	1	3
Clover, red, medium	16	5	12	26	38	2	7	38	1	6
Clover, cut when ready to bloom	14	7	12	24	41	1	7	39	1	6
Clover, cut in full bloom	14	7	12	24	42	2	6	39	1	7
Clover, cut nearly ripe	14	6	9	27	43	1	4	40	½	10
Clover, white, medium	16	6	14	26	34	3	8	36	2	5
Corn, Southern, young	25	5	7	24	37	1	4	40	½	9
Corn, Southern, older	25	4	4	26	39	1	3	39	½	15
Grass, Italian rye	14	8	11	23	41	3	7	41	1	6
Grass, upland average	14	6	9	29	39	3	5	41	1	8
Grass, Hungarian	13	6	11	29	38	2	6	41	1	7
Grass, Hungarian, cut nearly in bloom	17	7	11	29	35	2	6	38	½	7
Grass, Hungarian, cut in full bloom	17	4	8	28	42	1	4	37	1	9
Grass, Timothy, medium	14	4	10	23	46	3	6	43	1	8
Grass, Timothy, cut ready to bloom	12	4	8	29	44	2	4	44	1	11
Grass, Timothy, cut in bloom	12	4	6	29	47	1	3	42	⅜	13
Grass, meadow, poor	14	5	7	33	38	1	3	35	0	11
Grass, meadow, medium	14	2	10	26	41	2	5	41	1	8
Grass, meadow, good	16	8	13	19	40	3	9	43	1	5
Peas, cut in bloom	17	7	14	25	34	3	9	33	2	4
Vetch (tares) medium	17	8	14	25	33	2	9	32	1	4
Rye, cut before blooming	14	5	10	23	44	3	7	44	1	7
Green Fodder.										
Buckwheat, in bloom	85	1	2	4	6	½	1	7	0	5
Cabbage	85	2	2	2	8	1	2	8	0	5

			Total Organic Substance.				Digestible Substance.			
Articles of food.	Water.	Ash (mineral).	Albuminoids.	Woody fiber.	Other carbohydrates.	Fats.	Albuminoids.	Carbohydrates.	Fats.	Nutritive ratio
Green Fodder.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	as 1 to
Carrot leaves	82	3	3	3	7	2	2	7	0	4
Corn	85	1	1	5	8	½	1	7	0	11
Corn, fermented	79	2	1	8	9	1	1	10	½	16
Clover, pasture, young	83	1	3	4	7	1	4	7	1	4
Clover, red, when ready to bloom	83	1	3	4	7	1	2	7	10	4
Clover, red, in full bloom	80	1	3	6	9	½	2	9	0	6
Clover, white, full bloom.	80	2	3	6	8	1	2	8	1	4
Grass, before blooming	75	2	3	6	13	1	2	13	0	7
Grass, pasture, medium	80	2	3	4	10	1	2	10	1	4
Grass, pasture, rich	78	2	4	4	10	1	3	11	1	4
Grass, Italian rye	73	3	4	7	12	1	2	13	1	6
Grass, Hungarian (Millet), in bloom	75	1	3	8	11	1	2	12	0	7
Grass, Timothy	70	2	3	8	16	1	2	16	½	8
Grass, upland, average	70	2	3	10	13	1	1	14	½	8
Oats	81	1	2	6	8	½	1	9	0	7
Peas, in bloom	81	1	3	6	8	½	2	7	0	4
Rye	76	2	3	8	10	1	1	11	½	6
Rutabaga leaves	88	2	2	2	5	½	1	5	0	4
Sorghum	77	1	2	6	12	1	2	12	0	7
Vetch, at beginning of blooming	82	2	3	5	7	½	2	7	0	3
Straw, Stalks and Cobs										
Barley straw, spring	14	4	3	40	37	1	1	41	⅝	32
Bean straw, field	16	5	10	34	34	1	5	35	⅝	7
Corn cobs	14	3	1	38	43	1	⅜	42	⅝	71
Clover, after removal of seeds	16	6	9	42	25	2	4	28	1	7
Oat straw	14	5	4	39	36	2	1	40	⅝	30
Pea straw	16	4	6	38	34	1	3	33	⅝	12
Rye straw, winter	14	4	3	44	33	1	1	36	⅝	47
Vetch straw	16	4	7	42	29	1	3	32	⅝	10
Wheat straw	14	5	3	40	37	1	1	36	⅝	46
Chaffs, Hulls, etc.										
Barley	14	13	3	30	38	1	1	35	⅝	30
Bean	15	5	10	33	34	2	5	35	1	7
Oat	14	10	4	34	36	1	2	37	⅝	24
Rye	14	7	4	43	30	1	1	35	⅝	32
Wheat	14	9	4	36	35	1	1	33	⅝	24
Manufacturing and Waste Products, etc.										
Blood, dried	12	4	81		3	1	54	3	⅝	
Bran, wheat, fine	13	5	14	9	55	4	12	44	3	4
Bran, wheat, shorts	11	5	13	8	59	3	10	48	3	6
Bran, corn	12	3	10	9	62	4	8	57	3	8
Buttermilk	90	6	3		5	1	3	5	1	3
Brewers' grains	77	1	5	5	11	1	4	11	1	3
Cake, cotton-seed	11	6	24	22	30	6	17	15	5	2
Cake, linseed	12	9	29	10	30	10	25	27	9	2
Cake, sugar beet	70	3	2	6	18	0	2	25	0	14
Cake, palm-nut	10	4	17	17	41	10	16	55	9	5
Cream	62	⅜	3		3	32	3	3	32	30
Malt sprouts	12	7	26	9	45	1	21	44	1	2
Middlings	12	2	11	5	67	3	9	55	3	7
Meal, flesh	11	4	73			12	69		11	⅜
Meal, linseed, extracted	10	7	33	9	39	2	28	34	2	1
Meal, rice	10	11	11	11	48	10	9	47	9	8
Meal, wheat	11	3	14	5	63	3	11	54	3	6
Milk, cow's	87	1	3		5	4	3	5	4	4
Scraps, meat	11	4	73			12	69		11	⅜
Rice feed	15	6	9	8	60	2	7	49	1	7
Potato, starch factory residue	86	⅜	1	2	12	0	1	14	0	17
Whey	93	1	1		5	⅜	1	5	1	7

Food, FOR MAN: See article Hygiene. See also the same article for Food for Children and Food for the Sick.

Fool's Parsley. A wild plant growing in the Eastern United States, of the appearance of parsley, and poisonous. Poison hemlock is a similar plant growing through all the Northern States. Both bear seed-tops like parsley, celery or parsnip. It is safe never to eat or taste of any wild plant which has this kind of a seed-top, as most of them are more or less poisonous. When one is accidentally poisoned by them, he should be treated as for poisoning by Baneberry, which see.

Forage (for' age): see Fodder.

Force-Meat, meat chopped fine and highly seasoned, either served up alone or used as stuffing. Sometimes called "farce-meat."

Forceps, a pair of pincers or tongs; especially a finely-made pair for surgeons' or dentists' use.

Force-Pump, a pump which forces water through a tube by a pushing motion, instead of a lifting movement, as is done by a simple suction pump. See Pump.

Forcing PLANTS, starting them in hot-beds or otherwise before the season is warm enough for their out-door culture. Forcing was known among the ancient Romans, and was practiced from early times in England. At present it constitutes a large part of the care of gardeners. Among them success in forcing is an object of ambition, and its honors are worn with a good deal of professional pride. Some affect to have peculiar modes of practice, which they hide carefully from others, but which are often mere worthless conceits. The best forcing is that which is done in an atmosphere most conducive to the highest and strongest development of the plant, and not that which produces only a tender, abnormal growth. The artificial climate should not differ from what is normal to the plant, and the quantity of fruit should be kept somewhat below its capacity. Some plants are forced for use in winter by a process of simple self-exhaustion. Their strong roots being transferred in the fall to a cellar, or hot-bed frame, or heated pit, or green-house, yield a limited crop under the stimulus of the warmth thus furnished; this being obtained, the roots thus taxed are either thrown away or set out again in the spring to regain their ordinary strength. Sea kale, asparagus, pie-plant, succory, etc., are thus treated where it is deemed worth while. The more common vegetables, as lettuce, radish and other salads, require in their forced production in hot-bed frames but little if any more or different care, though longer continued, than is necessary for raising early hot-bed plants of various vegetables for setting out.

Cucumbers and melons are often raised in unfavorable localities by a system of half-forcing sometimes called "ridging." For this purpose a pit or trench, of any desired length, about three feet wide and two feet deep, is dug at the close of spring, and filled with heating manure in the manner of making a hot-bed, the manure being covered 12 or 15 inches deep with surface earth well enriched with garden compost and also chopped half-rotted sod, adding sand or road-wash if the soil be heavy. Potted plants, previously prepared in a hot bed, are set out carefully along the center of this ridge, in hills from four to six feet apart. Set a hand-glass over each hill; give air and culture as needed until the vines begin to run freely, then raise the hand-glasses upon bricks or blocks, that the vines pass under, nip or stop them at about two feet from the collar, that they may branch and blossom compactly; and when the full summer is upon them, remove the hand-glasses entirely, and give them ordinary but careful culture until the crop perfects. To make the vine-growth more moderate, old seed is generally used, or cuttings, if new seed has been sown. The cuttings made in the ordinary manner are set two or three in a pot and placed in a hot-bed with a slight shade, where they will root in a week or so, and form hardy, compact-growing plants. In more northern latitudes a closer confinement to the hot-house is of course required. For this class of plants the temperature should range from 60° to 80°; and to secure a uniform limit to this range, a lining of fresh manure must occasionally be substituted for the old around the bed-frame.

Fruits are forced by various methods. For strawberries, special houses are often made. They are narrow, of single pitch, with the glass reaching nearly to the ground. From a furnace sunk a sufficient depth at one end, a single line of stove-pipe or small brick flue, slightly raised, runs along the middle of the floor. The staging is built over this. Grapes are better forced in "graperies," and peaches in "peach-houses," made for these purposes. Several varieties of fruit are sometimes forced together in "orchard-houses." In all these structures, of course, reference is had to the peculiar demands of each plant. Fruits so forced require, even more than vegetables, constant care in respect to temperature, moisture, air, pruning and fruiting. Forced vegetables are started at once in summer heat; but in forcing fruits we endeavor to imitate the progress of spring, passing from 35° or 40° gradually to summer heat. During the period of the higher degrees of heat there should be free ventilation and plenty of moisture produced by syringing and watering. The night temperature may range uniformly about 10° below that of day. To make the treatment sure, a double-registering thermometer will be required. The ripening of the larger fruits will generally be effected in about five months from the first application of heat. Severe pruning has to be attended to during the summer, and many other nice points observed, which are fully described in works devoted especially to this subject, if one desires the highest possible results. Of course no one will undertake this difficult art unless he is convenient to a city market where high prices can be obtained.

See Hot-Bed, Cold Frame, Green-House, Gardening, and the various vegetables in their alphabetical order throughout this volume.

Foremanize: see Timber, Preservation of.

Forehand, the fore part of the trunk of the horse, or part immediately before the rider. It has to support and direct the neck and head, and is attached to the former by a great strength and peculiar arrangement of the muscles. In a saddle horse it should be light and unburdened, but in a draught horse it requires a sufficient body of muscle to combine the labor of propelling with that of supporting. The service derived from extra weight of the forehand, in horses used solely for the draught of heavy burdens, may be thus illustrated. Suppose a horse in endeavoring to make his way up hill overloaded, or as nearly as possible balanced by his load: he uses all his muscular force in vain, he can not advance, and it is uncertain which will obtain the mastery, he or his load; this is immediately decided by placing a boy or other weight across his shoulders; he is then enabled almost magically to proceed with facility, overcoming his load by means of a few extra pounds on the fore part of the body.

Forestry, the science and art of propagating forest trees; woodcraft. In our language and in our country, the forest usually implies a considerable extent of surface, while a smaller area covered with trees is called a wood, and a more limited number of trees constitute a grove. The portions of our country now occupied by trees are more appropriately called woodlands than forests. Planted in lines of one or of several rows of trees, intended to intercept currents of air, they constitute hedge-rows, wind-breaks, or shelter-belts. The coppice or copse is a wood that is intended to be cut off from time to time, when comparatively small.

At first one would think that scarcely anything practical on the subject of forest tree planting could be said further than, when you get ready to plant forest trees, go and plant them; but when we consider the diminishing numbers of large lumber trees in the United States, their value as wind-breaks on our western prairies and the fact that the ground denuded of one kind of trees must be followed by another kind if any, etc., we perceive that comfort for our later years, and justice to future generations, require us to pay some attention to this matter. We find here not only a large field for thought, but also a large "field" for the actual planting of trees. As this enterprise is comparatively so slow in yielding pecuniary returns, and as it interests posterity more than ourselves, it becomes everybody's business and therefore nobody's business, in particular, and the aid of National and State legislation has to be invoked. Such legislation we have already obtained, indeed, to some extent, but need more State aid. In connection with the general Government we have a National Forestry Association, with which every one ought to be in communication. The address of the proper officers can be obtained without cost by asking the Department of the Interior at Washington.

The destruction of our forest trees and the waste of timber still go on at a more rapid rate than renewal. Correspondence and statistical compilation have revealed the fact that at the present time (1881-2) the forest trees are diminished a little more than twice as rapidly as planting is carried on. At a late meeting of the Chicago Lumbermen's Exchange the somewhat startling statement was made, and substantiated by conclusive figures, that, owing to the enormous growth of the lumber business in this country, it will take only twenty years longer to exhaust the pine forests of the United States of America. If the present rate of depletion continues, in the course of five years all of the black walnut timber large enough for logs will be used up; also the rate our oak timbers are being used up for railroad ties, cooperage and other purposes, in the course of forty years our forests of oak will be consumed. Other varieties of timber are disappearing in proportion to the above named.

The value of the annual cutting from the American forests is near $1,000,000,000, which is consumed in 1,000 different ways. Over 1,000,000,000 cords are used for fuel. In 1871 10,000 acres were stripped to supply Chicago alone. To supply the demands of the railroads in the State of New York 50,000 acres of woodland have been cleared in a single year. Then, the annual losses by forest fires are something enormous. The loss from the fires of 1871—which swept over Wisconsin, Michigan and New York—is estimated at over $125,000,000. In 1876, and again in 1879, Pennsylvania suffered terribly from these forest fires, which in 1876 destroyed timber in value beyond computation in New Hampshire, Vermont, Massachusetts, Wisconsin and New Jersey. In 1878 the woods on Lake Superior were afire almost continuously for 160 miles. These figures give a general idea of the importance of a proper care being taken of our forest lands and of the immense annual demands upon them.

In view of these facts every philanthropist is exhorting land-owners throughout the country to plant trees, and scolding all those who burn up timber which might be marketed; but, whether to save or burn a given tree or log depends upon the primary law of demand and supply. If it costs more to take the timber to market than can be obtained for it, and it is not worth as much as the ground it occupies, of course it should be burned. The reproof for wanton destruction is deserved by those who are carelessly ignorant of the value of timber. Many trees are worth more than their owners imagine. Many a black walnut, for example, in the Lake region, has sold for $1,000 to $1,200 in the rough. The specimens were about seven feet in diameter three feet from the ground. Butternut, maple (especially "bird's-eye"), hickory, white ash, iron-wood, tulip-tree, oak and cedar are specimens of the most valuable species, much of which are either wantonly destroyed or carelessly permitted to go to waste.

On the other hand, the direct profits of tree-planting have been definitely tested in this country. One experiment, in Massachusetts, where an exact book account was kept, resulted as follows: 100 acres of nearly valueless land was assessed at $50 an acre by the law officers; interest for 20 years, $6,000; taxes, $5,000; fencing, $400; oversight, $50 a year, $1,000; 50,000 trees (expense), $1,500; planting, $600; total, $14,500. Per contra, 50,000 trees at 75 cents each, $37,500; 5 per cent. loss, $7,300; gross proceeds, $30,200; net profit, $15,700, which is more than 200 per cent. of the capital invested, or 11 per cent. each year. But several improvements even on that experiment can be made. In the West the European larch is found the most profitable tree. It is hardy, of rapid growth, easily transplanted, and bears close or thick setting. At seven years of age the tree may be used for stakes. Then the first thinning is made. The second thinning is made at 14 years, when 3,600 fence-posts are cut per acre, valued at $1,000. The third thinning is made at 21 years, giving 600 trees per acre, worth $3,000. The fourth cutting, at 30 years, yields 300 trees, at $6,000. This makes a total of $10,000 from the acre in 30 years, with 300 trees still left upon the ground, worth $6,000 more, which will continue to increase in value for half a century longer. This is not mere paper scheming, but actual facts, so far as reached by Mr. Schofield, of Elgin, Ill., by the Dunlap estate, near Champaign, Ill., by Ezra Sherman, Preston, O., and others.

The following calculations are safe: At four feet apart, there will be 2,720 plants to the acre. Thinning out every alternate tree at the end of six years will leave 1,360 trees on the ground. At the end of 12 years one-half of these may be cut. The 680 trees will give 136 split posts first cut, at

20 cents	$272
680 round posts second cut, at 20 cents	136
680 round posts third cut, at 15 cents	102
Total	$510

Were the whole to be cut, the yield would be double, or $1,020 as the value of the tract, and we may say, in round numbers, that the crop of an acre at the end of twelve years is worth $1,000. Or, taking the safer estimate of 1,200 trees to the acre after being thinned, and allowing a higher valuation of the posts, but still below the market value of posts, we make the following showing:

2,400 split posts at 25 cents	$600
1,200 round posts at 25 cents	300
1,000 round posts at 20 cents	200
Total	$1,100

It is not, however, good policy to remove the whole crop at this time, for the half that is left at each thinning will rapidly improve until the number is reduced to about 300 per acre and then for half a century longer these will go on increasing in value in a geometrical proportion.

But we are only beginning to experiment in this country. We want more statistics on every point and feature of the subject,—the kind of soil and exposure for each species of tree, the term of rotation, the time required by them to reach their maximum of profit, their relative rapidity of growth, their nature as to proximity to eachother, their influence upon climate, health, farm, garden and orchard products, money values, etc., etc. To work up data upon these points requires longer study and more patient trial than anything else in the whole vegetable or animal kingdom. In Germany they actually have forestry schools, where one may attend and learn what is to be known. That country is far in advance of any other Christian nation in forestry science, having several million acres under the supervision of the government, with officers to distinguish what trees to plant, in what situations, what trees to cut, etc. In this country every farmer should have a moral and educational, as well as a pecuniary interest in making the study of the woods attractive, both to himself and to his children. Sunday afternoons the whole family should take a stroll in the wildwood, if such a place can be found within eight or ten miles from home. Every boy should become thoroughly acquainted with all the trees and shrubs of his locality, so that he can recognize them both summer and winter, whether standing or lying as logs in any stage of decay. He should become familiar with the habits of growth, the nature and uses of the wood, bark, etc., of every species of tree and shrub in his vicinity. The primary products of the forest are logs for lumber and nuts for eating, and the secondary are the barks, fibers, withes, roots, pitch, resins, oils, galls, dye-stuffs, medicines, sugars, gums, charcoal, ashes, etc.

As an expression of the general interest taken in tree-culture by men of information, we here give the substance of the resolutions under which the Ohio State Agricultural Society is working, namely: that farmers and land-owners should plant their hillsides, ravines, and broken or rocky grounds with forest trees; that at least one-tenth of each farm should be planted with groves and shelter belts of timber trees, deciduous and evergreen; that agricultural societies be urged to offer suitable premiums for the encouragement of tree-planting and nurseries of trees; that State Legislatures should encourage tree-planting along the sides of highways and railroads, and adopt more stringent measures for the protection of the present forests: that Congress, by grants of land and otherwise should encourage the enterprise of private citizens who may give assurance of their ability to demonstrate the important problem of planting artificial forests on the great Western plains, and should require railroad companies and settlers of homesteads to plant a due proportion of their land with useful timber trees; and that the agricultural schools give more attention to the teaching of the science and art of forestry. There is a real objection, however, to hedging and shading the highways with trees, as it keeps the roads muddy and rough a greater portion of the time; but, notwithstanding this objection, and in full view of the case after a thorough discussion, a majority of the societies as well as of the experimenters, seem to be in favor of lining all roads with trees, as the less of the two evils we must suffer.

We have not space here to give the proofs and considerations pro and con on the questions of the influence of timber belts upon the fall of rain, the relative value of the different species of trees, or even the history of what has been done in forest culture in the United States; but will attempt merely to give the substance of the practical results, although there are some good people who may doubt a few of the statements here made:

1. Extensive forests do cause a more even distribution of rain-fall throughout the season, and groves near a plantation do protect it from high winds and much of the excessive rigor of climate. When the wind is from the West, it is one to ten degrees warmer on the east side of a hedge or timber belt than on the west side, according to the amount of sunshine on either side. On a large scale a heavy forest protects the land on the same principle that a heavy stock of dead grass protects the ground on a small scale.

2. On most of the Western prairies there are not timber trees enough planted yet, although there are more young trees now coming on than there have ever been before. Much of this young growth will be cut off before it is large enough to make boards or good manufacturing material.

3. In the timbered sections the clearings are not followed up quite closely enough by the planting of other and more useful trees to succeed the old forests.

4. In renewing a grove, never plant on the ground the same kind of trees which were upon it before.

5. In transplanting young trees from the forest, preserve its natural surroundings as closely as convenient as to kind and condition of soil, amount of shading, etc., and keep the same side to the north as it originally had. Putting out a tree with its north side turned to the south, the sun will scald and kill it. Stake and tie, or otherwise protect against the wind all those young trees transplanted from a protected place in the woods. The principles of root and top pruning applicable to orchard culture of fruit trees are also applicable to forest tree culture. High winds shake and tear the leaves and tops of most of our wayside trees so much that they cannot perform their function, and the trees send up suckers or sprouts for a substitute.

6. Some trees are more rapidly and vigorously started from the seeds, and a few are better propagated by cions.

7. The most valuable trees, in general, are those of rather slow growth, as the oak, the hard maple, black walnut and white ash, while those of rapid growth soonest produce shade, but have rather poor wood and are more exhaustive of the soil, as cotton-wood, white maple and buckeye.

Some trees are uncouth in their appearance, some cannot stand the high winds characteristic of our Western prairies, some are subject to a borer which weakens the limbs, while others are sickly in their new situations from some unknown cause. Of native species worthy of planting, the most valuable tree for furniture is evidently the black walnut; next are white ash and hard maple; bird's-eye or curled maple is a fancy wood for ornamental work, but it cannot be propagated at will; the most valuable wood for floors and stairways, handles and stocks of implements, is the white ash; the best for veneering is the white walnut, or butternut; for hedge and wood-work of wagons and carriages, the best is Osage orange; for railroad ties, the best are European larch and white oak; for high hedges and wind-breaks, among the best are Norway spruce and white pine; for fence posts, the Osage orange and the magnolia (speciosa, the Western), are among the best; for bordering sloughs and wet places, the best is almost any kind of willow.

CULTURE. There are, on almost any farm, some portions that are more or less broken and indifferently adapted for cultivated crops. On the most level farms there are knolls and swells, or ravines and swales, but in the hill country there are steep declivities, some of which are rocky or stony. All such lands may be made to produce great crops of timber, and should be so appropriated, to cover them and to prevent the necessity of cultivation or the loss and inconvenience of having them neglected eye-sores and briar patches, wastes, secreting vermin and giving the whole farm a neglected and untidy appearance. In a level country, where the whole surface is arable land, and where there are no such waste spots to occupy and embellish with timber growth, any portion of the property may be appropriated to the grove; but here it may be well to make the plantation as a shelter belt, by planting one or two strips to the windward, say the west, north or south sides. These should be sufficiently wide to protect themselves and the rest of the farm, or from four to eight rods. Mr. Bryant advises a strip of eight rods on two sides of every quarter section of land.

The land should be well plowed and harrowed. In raw prairies, the trench plow will be the best means of preparation; if old ground, any good plowing will answer. Like any other crops, the timber planting will be aided by thorough preparation of the soil for the seeds, cuttings or plants. Large seeds should be set at once in the field; cuttings and delicately growing seedlings had better be started in a nursery. If the land be very broken or rocky, this thorough preparation of the soil cannot be given to it, and all that can be done will be to clean it up, by grubbing and removing the weeds and briars, digging holes for the trees.

The usual method of renewing the forest is either pitting, notching, seeding and self-seeding or natural reproduction, which last, when not entirely satisfactory in its results, is complemented by filling in the gaps with useful and desirable species, planted by the first named process; this is particularly practiced with the oaks, and these are usually planted of large size. Pitting consists in digging holes, at suitable intervals, in which the young trees are planted. Notching is a very simple process, cheap and primitive. The tool used is a peculiar, narrow and thick spade, which is thrust down into the sod, withdrawn and again inserted so that the two cuts shall be at right angles, and before withdrawing the tool the cleft is opened, and the plant is inserted by an assistant and held in the angle thus formed until the spade is withdrawn, when the earth is pressed against it with the foot, and the little tree is left to take care of itself. Attempts to plant in this way have not been very satisfactory in our country, especially where blue grass abounds.

For the larger seeds or nuts, the ground should be marked off with a light furrow, into which they are dropped and then covered with a plow or harrow. They may be put in hills or squares, like corn. If young trees are set out, it will be necessary to open holes for them with the spade, and in planting them it will be advisable to pack the earth very firmly about the roots. This is particularly necessary with young conifers, such as larch and cedar, and other evergreens. The planting should also be done very early in the spring, or as soon as the labor can be done after the soil is dry enough to work pleasantly. It has been recommended to plant a crop of corn on the land preparatory to setting out the trees, in which case the work may be done in the fall, planting a tree beside each hill; the cornstalk or stubble will afford protection to the young tree, and guide the planter. In meadow soil properly prepared, the planting of young trees is a very simple affair. The spade is thrust deeply into the ground, a cleft is opened into which the tree is planted, and by inverting the spade the soil is pressed against the roots firmly. When we have to deal with the more valuable and costly tree, or with those of larger growth, more care is requisite. The hole must be dug and the plants set by hand, bringing the earth among the roots and upon them, and then stamping it closely about them. When handling the plants, be very careful to prevent the drying of the roots. This is especially requisite with resinous trees and with some other kinds, such as the tulip poplar. With some of the hardy sorts, such as the cotton-wood and soft maple, a very primitive process is often employed. The little trees are simply laid along, with their roots in the furrows and covered with the plow, after which the land may be rolled. Some of the soft-wooded or marsh trees will grow from cuttings as readily as the grape. Oaks, if removed when two years old, cutting off the tap root, and again afterward when the roots run downward, will do well. Hundreds have been transplanted when 12 feet high and three or four inches in diameter, with little or no loss.

There has been a great difference of practice among farmers as to the proper distance to set trees in timber plantations. Many have erred by planting too wide, few by setting too closely. Both extremes may seem to follow nature. In the matured forest, the trees are widely separated, it is true, but in the young forest growth they are closely crowded together, and where so crowded the finest timber trees are the result. The widely planted trees will require much labor to train them into shape, all of which may be avoided by close planting. Many plantations have been made 8 by 8 feet, some wider, but the best practice with almost all tree-planting is to set closely. Five feet and 5 x 6 is still recommended, but 4 x 4 is much better, and some advise 3 x 3. Mr. Edwards, of Illinois, says he would set larches 3 x 3 as nurses for pines and spruces planted among them every 12 feet. Hickories, chestnuts, elms, and all such trees as may be used for hoop-poles, when these are in demand, can be planted in close drills, thickly, so that in four or five years a crop may be removed, leaving the thinned trees to develop themselves.

The young trees should be thoroughly cultivated for a few years. The first summer the two-horse cultivator may be used; after this the double shovel must be taken. In the fall after planting, it may be well to bank them with a turning plow as a protection in winter. In most cases the hoe will be needed while the trees are small, but in after years the shade will keep down the weeds.

When planted thickly there will be little need for trimming the trees. Nature will effect this unaided by her own process of smothering. It may often happen, however, that some species will produce double headers, one of which should be shortened at once or removed. The side branches will soon die and fall off when the tops form a canopy. This is not the case in wide planting; if they have room to spread, the trees will be branched, and it often happens that several of these branches will strive for the mastery. When this occurs all but one should be shortened, or, if small, removed. If a tree here and there appears stunted, or injured by accident or insect, cut it off at the ground in the winter, and it will be reproduced by a strong, clean shoot. In this case the smaller sprouts must be kept away, in order to concentrate the forces of all the roots upon one shoot, which will thus often be able to overtake the older trees in its vicinity. The extra care, however, required for this procedure, is scarcely ever remunerative.

Trimming will require the exercise of sound judgment; nor can it be directed by a set of rules indicating the days and years when it should be done. The object of close planting is to give the trees an upward growth without side branches, but when this has been attained, we must watch lest the plants become crowded and chafe one another. The period when thinning may become necessary, will depend upon the variety planted and the rapidity of their growth. Some will need it sooner than others, but as a general rule, the plantations should be thinned before the trees are too much grown. If in drills closely planted the supernumeraries must be cut out, taking always the poorer trees, and leaving the stronger with sufficient room for development. If the planting has been done in squares, every alternate tree, or if in close rows, every alternate row may be taken away at the first cutting. In a few years the same process will be needed as the trees continue to grow and crowd. Every alternate tree may now be taken away.

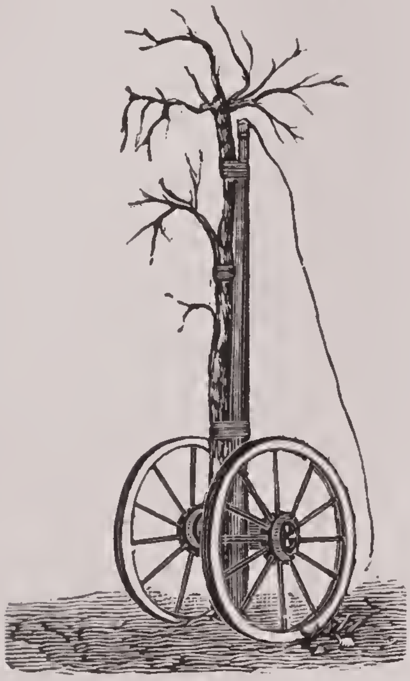


Fig. 1.–*Transplanting Large Trees.*

Trees can be transplanted safely at any age, but, unless at the best time, extraordinary care may be required. The old practice of digging a trench around the tree late in autumn, leaving it to freeze, and then removing the whole mass as a frozen ball of earth some time during the winter, is generally abandoned as being more expensive than is necessary. Trees, both deciduous and evergreen, can be removed in mid-summer after the growth of the season has somewhat ripened, in which case the foliage of the deciduous tree should be clipped off up to the middle leaf of the stem, and the present year's growth of the evergreens all cut off except one bud.

Figure 1 represents an apparatus for transplanting large fruit or forest trees. It is merely a pair of large wheels and an axle. A piece of 4 x 4 inch studding is tied to the tree with cloths, straw, or something to prevent bruising the bark of the tree, and a rope at the upper end. A trench has previously been dug around the tree. When ready to move it, fasten the axle firmly to the studding or timber, seize the rope and pull the tree into a horizontal position, when it is ready for transportation.

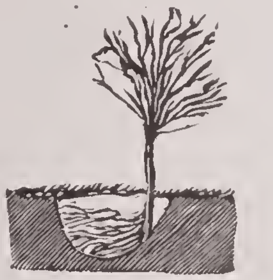


Fig. 2.—*Wrong Way to Treat the Roots.*

The holes into which the trees are set should be four inches greater in diameter than the mass of roots, and the base of the center should be a little mound of earth, on which the roots should be spread out as in Fig. 3, and not as in Fig. 2. Fine rich soil should then be pressed carefully under and around the roots with the hands, and not stamped down with the feet, except a little at the finishing. The upper tier of roots should be covered about four inches, and the whole setting so done that after the earth has settled the tree will be at the same level with the surface of the ground that it originally had. Then mulch for six feet around, more as illustrated by Fig. 4 than by Fig. 5, for several very obvious reasons.

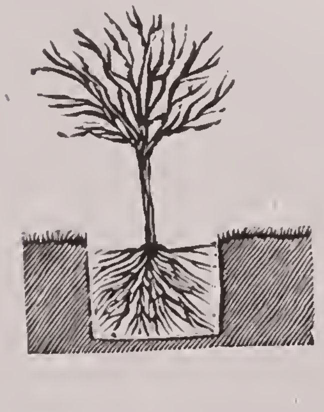


Fig. 3.–*Right Way to Spread the Roots.*

The best age for transplanting apples, pears, and plums as standards is at two years from the growth of the bud or graft. The pear grown upon the quince, the apple upon the Doucain or Paradise stocks, the peach upon the plum, the apricot and nectarine upon the plum, should be planted at one year from the bud or graft. If the trees come from a nursery not cultivated by yourself, first wet the package on the receipt of it, before opening, and then dig a trench in some light dry soil, and heel the plants in. If in autumn too late for planting, throw also some brush over them.

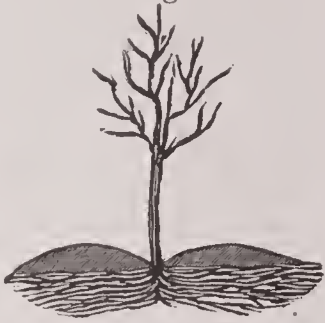


Fig. 4.—*Proper Mulching.*

Seeds of fruit trees should never be permitted to become perfectly dry. Bury them in a moist, cold place, but not wet, say under three or four inches of earth on the north side of a building, until planting time. Peach and plum stones should be carefully cracked; but cherry stones will open of themselves, and should be first planted in spring, which will allow sufficient room for those remaining to go on growing for another term of years. By systematic removal of the surplus trees, always taking the weakest, the remnant may be left at the last thinning, at an average of twelve feet apart, at which distance many kinds may remain for a long time. Valuable trees that you wish to propagate should be cut in the spring. Those that you wish to exterminate should be cut in August.

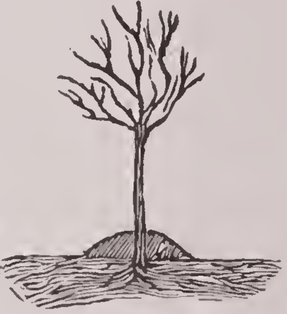


Fig. 5.–*Wrong Mulching.*

Whether natural or artificial, the forest must always be kept carefully inclosed so as to exclude all kinds of stock. Young trees especially need this protection from the trampling of cattle; but even large trees in the more matured forests are often seriously injured by intruders of this class.

The preservation of our native forest growths is a matter of equal importance with the planting of groves and coppices where the former does not exist. For this purpose the first requisite is their inclosure, so as to preserve them from the depredations of domestic animals. Next in importance is the prevention of fires, which are often allowed to destroy vast tracts of the most beautiful trees, and at the same time to burn up infinite numbers of young trees, that, if not so destroyed or browsed off by cattle, would be ready to spring up into new forest growths wherever the trees already matured should be cut away.

An earnest appeal is made to wait no longer, but to begin at once to plant forest trees,—plant them for their beauty; to plant them for the shelter they afford; to plant them for their happy effects in modifying and equalizing the climate, in checking the force of the winds, thus preventing excessive evaporations and cold; to plant them for their utility upon the farm; to plant them for patriotic motives; and finally, if you can be touched by no more refined sentiment, to plant timber trees as a farm crop, for their *profit*, which is a demonstrable proposition, as already set forth.

SPECIES. Following is a tolerably complete list of the trees recommended for propagation, with such notes as will enable the reader to compile lists for his own locality. The confusion in names of trees, and especially of shrubs, as used in various parts of the country, is often quite bewildering. This arises in a great variety of ways among those who have little observation or no knowledge of botany. For instance, one is called by some "whitewood" and "tulip-tree," by others "poplar." The latter name is also used for several other species of trees. Two species of trees are indiscriminately spoken of as the "soft maple." The names of our oaks are a good deal mixed up. This is true of the scientific descriptions as well as of the common names. We have seven species of birch, five of which are trees. Two or three of them are known as "yellow birch" in different sections of the country. Two others are indiscriminately called the "white birch." Hardly any one, unless a botanist, pretends to know the species of our willows and poplars and cottonwoods. Two or three different species of pine are known in different parts of the country as "scrub pine," "gray pine," "buckwheat pine," "black pine," "jack pine." Of course there is still greater confusion of names and want of any common name among some of the shrubs and the rare trees.

Arbor-Vitæ, American. The most valuable of the Thuyas; wood light-colored, compact, light, very durable and largely employed for posts, railway ties, fencing, etc. The western spe ies is liable to split and warp in the sun.

Ash, White. The most valuable of the family, as its wood is the best for tool and implement handles, for portions of carriages, cabinet-work, cars, stair-steps, etc.; first-rate for fuel also. The black ash is employed in basket-making, etc.

Bass-wood, Lin, Linden, Lime, Teal, White-wood. Well known; wood largely employed in turnery, interior work and manufacture of wooden ware: excellently adapted to our western, black prairie soil. Bark good for cordage, matting, etc.

Birch. The white birch is manufactured into spools, shoe-pegs, etc.; the sweet or mahogany birch (Betula lenta) is valuable in cabinet-making and for fuel; the red birch is common along our western streams, and the canoe or paper birch is good for fuel, for the manufacture of spools, shoe-lasts, pegs, etc.

Box-Elder, or Ash-Leaved Maple. Well known as a fair shade tree, but not very ornamental; propagates itself like weeds, and is very tough.

Buck-Eye. A rather low tree, with beautiful and luxuriant foliage; common in the bottom lands along our larger water-courses.

California Laurel. See Laurel.

Catalpa. The best catalpa for planting in the Northwest is what is called the Western; when full-grown it is 80 feet high, with a trunk 4 feet in diameter; one of the best for railway ties, fence-posts, etc., and is good for cabinet work. Its flowers are earlier, larger and whiter than those of the other kind.

Cedar, Red. The most valuable of the cedars.

Chestnut. Valuable nut-bearing tree in the older States.

Coffee-Tree or Coffee Bean. See Kentucky Coffee-tree.

Cucumber Tree. See Magnolia.

Elm. The white elm is the most common and is being extensively planted as a way-side tree; the wood is used in making hubs, water pipes, etc. The cork or rock elm yields a first-rate wood for heavy agricultural implements, furniture, and all purposes requiring a combination of strength, toughness and solidity.

Fir. The most valuable is the Norway spruce. The black spruce is valuable for paper and for lumber.

Holly, American. A small tree, rarely 40 feet in height; wood white, heart-wood brown, close-grained, heavy; used in cabinet-work, turnery, etc.

Honey Locust. Sometimes planted in the North where it is not found native; good for hedges.

June-Berry. See Shad-bush.

Kentucky Coffee-Tree, or Coffee Bean. Produces beautiful foliage and beans; of little account for anything else.

Larch, American, or Black; Tamarack; Hackmatack. These several names are applied to a well known deciduous tree with pine-like leaves, so valuable for posts, telegraph-poles, railway ties, upper knees of ships, etc. The European variety is more profitable, probably the most profitable of all.

Laurel, Mountain, California Laurel, etc. A tree from the Pacific coast of full forest height, whose roots yield a volatile oil; the wood is brownish, close-grained, susceptible of a fine polish, and is highly esteemed, especially that of the roots, for cabinet-making.

Lin. See Basswood.

Locust, Common. Well known; too tender for the latitude of Northern Illinois.

Magnolia, or Cucumber Tree. A large tree, 60 to 80 feet high and 2 to 4 feet in diameter; wood soft, close-grained; preferred for pump logs.

Maple, Sugar, Hard or Rock. Well known as the best shade and ornamental tree, whose wood is good for manufacturing purposes, and sap the best for sugar.

Maple, White or Silver. Well known as a beautiful tree, except that it is subject to the borer and to breaking down by wind.

Maple, Ash-leaved. See Box Elder.

Mountain Laurel. See Laurel.

Mulberry. A small tree, sometimes 70 feet high, with a trunk two feet in diameter, bearing edible, sweet fruit; wood yellowish, heavy, exceedingly durable, valuable for posts, tunnels, etc.

Osage Orange. The best for farm hedges, if not too far north.

Pine. The white is best for general utility; next the Scotch, Austrian, red, etc.

Red-Bud, or Judas Tree. Good only for ornament.

Service-Berry. See Shad-bush.

Shad-bush, June-berry, Service-berry, etc. Recommended for planting by some horticulturists as a kind of ornamental tree; it bears edible fruit; on the whole it is comparatively unimportant.

Spruce. Fir.

Sweet or White Bay. A small tree in swamps; roots yield a yellow dye.

Tulip-tree, Yellow Poplar, White Wood. A large tree 70 to 100 feet high, 4 to 7 feet in diameter; wood light, close-grained, strong, easily worked, extensively used in building, interior work, shingles, panels, boxes, etc.

Walnut. The black walnut is probably the most profitable tree to plant for future generations, as its wood is so valuable in cabinet-ware, saying nothing of the nuts and the bark, which latter yields a very good dyeing material; becoming very scarce in the forests. The white walnut, or butternut, is now used extensively in veneering, in cabinet-making, its bark yields a valuable dye, and the nuts it bears are very popular. This species is also becoming scarce.

White Bay. See Sweet Bay.

White Wood. See Tulip-tree.

Wild Black Cherry. Too plentiful in the forest to want propagation elsewhere.

Willow. Almost any species is valuable for planting in wet places and along the banks of streams.

Yellow Poplar. See Tulip-tree.

The best trees to raise for timber in Michigan are white ash, hickory, black walnut, white pine, white oak, European larch and chestnut. The five best for Iowa are said to be black walnut, chestnut, white ash, silver maple and European larch.

Fork: for Hay Fork, see Hay.

Founder, to cause internal inflammation and sore feet and limbs—of a horse; also, general fever or acute rheumatism, as "chest founder."

Fountain. Artificial fountains for both parlor and lawn can be obtained at many hardware stores. A parlor fountain has been invented which is renewed every hour by simple inversion of the frame on a rotating bar. Where a residence is situated below the brow of a hill, or where wind-mill pumps are in operation, it is easy and inexpensive to keep a lawn fountain in continual play. A fountain is easily made at home, but those in market are generally far more ornamental. There is nothing so refreshing to the view in sultry weather as a fountain or a cataract.

Fowl, Domestic. In a restricted sense this term is used to designate the cock and hen, or the genus Gallus in the order of Gallinaceous birds; and in poultry vernacular even the word "fowl" itself is used to designate this otherwise nameless species. Other terms are also employed, as "barnyard fowl," "barndoor fowl," "chicken," "hen," etc. But in the broader sense the term "domestic fowls" includes the turkey, goose, duck, Guinea-hen, etc.

There is no more profitable or interesting subject to which the farmer can give heed than that of raising the domestic fowl. No animal or fowl has a record that excels it, and for its antiquity and universality it has no peer. The cock is the well-known chieftain of the poultry-yard, and rural announcer of the passage of time. His shrill clarion, heard in the still watches of the night, inspires the invalid with cheering hopes of the coming dawn, and informs the way-worn traveler of his approach to the habitations of his kind. He is the appropriate emblem of vigilance, virility, warlike daring and gallantry; domesticated, but not subdued, he marches at the head of his train of wives and offspring with a bearing of proud defiance, not less ready to punish aggression against his dependents than to assert his superiority upon the challenge of any rival. At what time this valuable species of pheasant was brought under the immediate control of man, it is now impossible to determine; but as the forests of many parts of India still abound with several varieties of the cock in the wild or natural condition, it is quite reasonable to suppose that the race was first domesticated in the Eastern countries, and gradually extended thence to the rest of the world. It is stated that the cock was first introduced into Europe from Persia; nevertheless it has been so long established throughout Europe as to render it impossible to trace its progress from its native wilds. In the palmiest days of Greece and Rome he occupied a conspicuous place in the public shows which amused the masses of the people. He was dedicated to the worship of the pagan deities, and was connected with the worship of Apollo, Mercury, Mars, and particularly Esculapius.

The practice of cock-fighting, barbarous as it is, originated in classic times, and among the most polished and civilized people of antiquity.

The cock has head surrounded by a notched, crimson, fleshy substance, called comb; two pendulous, fleshy bodies of the same color, termed wattles, hung under his throat. The hen has also a similar, but not so large or so vividly colored excrescence on her head. The cock is provided with a sharp horn or spur on the inside of his leg, with which he inflicts severe wounds; the hen, instead of the spur has a mere knot or tubercle. There is in both sexes, below the ear, an oblong spot, the anterior edge of which is reddish and the remainder white. The feathers arise in pairs from each sheath, touching by their points within the skin, but diverging in their course outwards. On the neck they are long, narrow, and floating on the rump they are of the same form, but drooping latterly over the extremity of the wings, which are quite short, and terminate at the origin of the tail, the plumes of which are vertical. In the center of the cock's tail are two long feathers, which fall backwards in a graceful arch and add great beauty to the whole aspect of the fowl. It is in vain to offer any description of the color of the plumage, as it is indefinitely varied, beiny in some breeds of the greatest richness and elegance, and in others of the simplest and plainest hue. Except in the pure white breeds, the plumage of the cock is always more splendid than that of the hen. We cannot contemplate the cock, when in good health and full plumage, without being struck with his apparent consciousness of personal beauty and courage; his movements and gestures seem all to be influenced by such feelings, and his stately march and frequent triumphant crowing express confidence in his strength and bravery. The sagacity of the cock is excessive, and one is known as to be quite sufficient for the fecundation of 10 or 15 hens. His sexual powers are matured when he is about six months old, and his full vigor lasts for about three years, varying with earliness of maturity and with his size and even the climate.

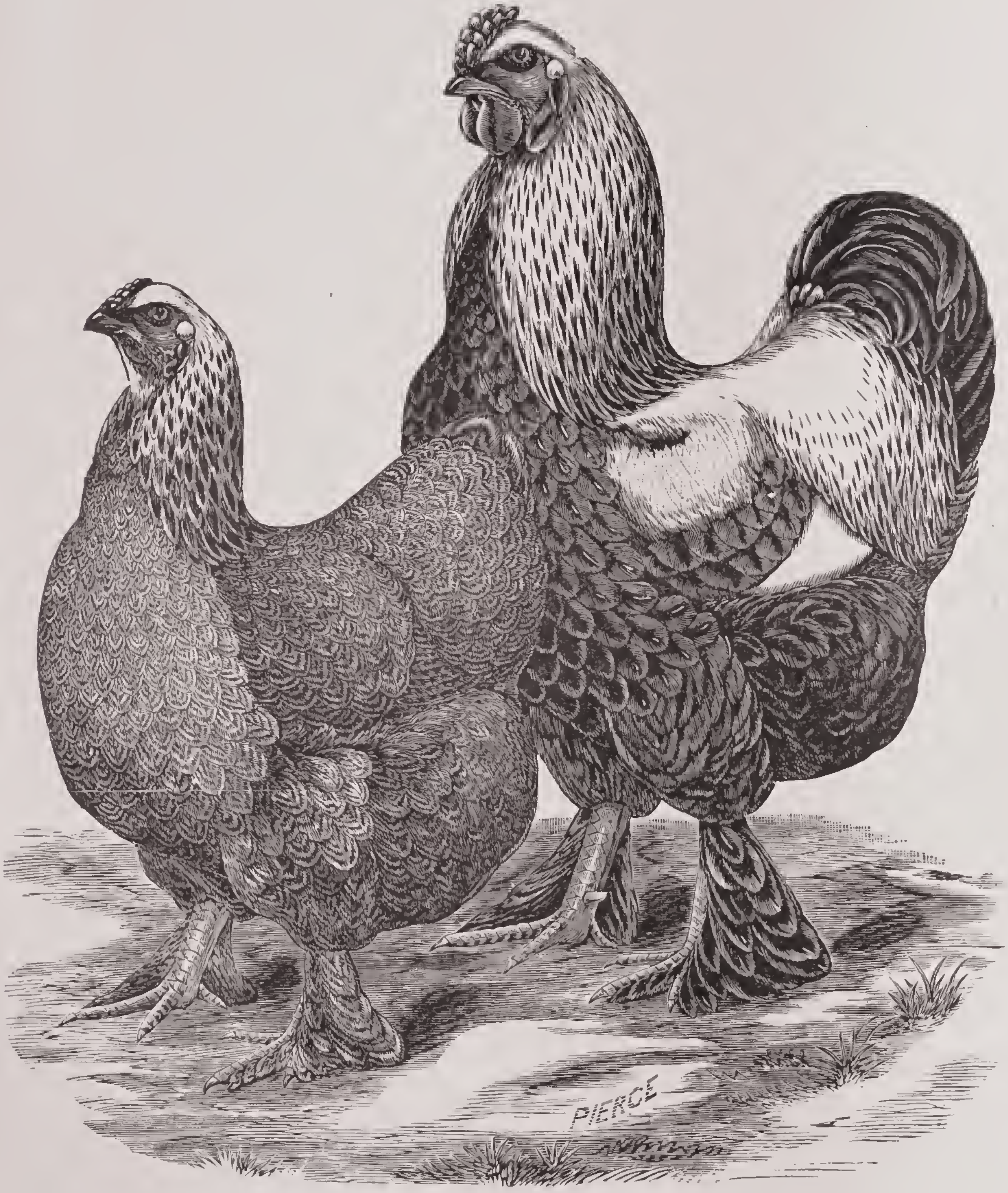


Fig. 1.—*Dark Brahmas.*

The hen is deservedly the acknowledged pattern of maternal love. When her passion of philoprogenitiveness is disappointed by the failure or subtraction of her own brood, she will either continue incubating till her natural powers fail, or will violently kidnap the young of other fowls and insist upon adopting them. She is ready to commence laying after she has moulted or changed her plumage, and is not at the trouble of making a regular nest. A simple hole scratched in the ground in some retired place serves the purpose, and she generally lays from 12 to 15 eggs before she begins to sit upon them for the purpose of hatching. Having thus taken possession of her nest, she becomes a model of enduring patience, remaining fixed in her place until the urgency of hunger forces her to go in search of food. A short time suffices; she runs eagerly about in quest of sustenance, and soon resumes her charge. Her eggs are diligently turned and shifted from the center to the edge of the nest, so that each may receive a due degree of genial warmth, and it is not until about 21 days have elapsed that the incubation is complete. The strongest of the progeny then begin to chip the shell with the bill, and are successively enabled to burst their brittle prisons. She continues upon the nest until the whole are hatched and dry, then leads them forth for food. The hen, except when accompanied by a young brood, is always timid, and ready to fly from disturbance, but when she engages in discharging the duties of maternity her whole nature is changed. She fiercely and vigorously attacks all aggressors; watches over the safety of her young with the utmost jealousy, neglects the demands of her own appetite to divide the food she may obtain among her nurslings, and labors with untiring diligence to provide them sufficient sustenance.

The limits within which we are restricted forbid the attempt to give a complete history of this valuable species, which is, in every point of view, interesting. To detail all that would be necessary to illustrate it as an object of natural history and domestic economy, would require a volume. We will, however, in a practical way, treat the modes of breeding and rearing, the best breeds, with engravings of same, and the manner of preparing for the market and the table.

VARIETIES OF FOWLS.

BANTAMS. Some authorities claim that the original of the Bantams is the Bankiva fowl, of the East Indies; others claim that the numerous diminutive fowls known as Bantams have no ancestry in original stock, but are "artificial fowls," inasmuch as they have been carefully dwarfed and perfected by the art of man. The smaller varieties of poultry are generally known under this name. They are not especially valuable, being kept entirely as pets for ornament.

These little creatures exhibit some peculiar habits and traits of disposition. Amongst others, the cocks are so fond of sucking the eggs laid by the hen that they will often drive her from the nest in order to obtain them; they have been even known to attack her, tear open the ovarium, and devour its shell-less contents. To prevent this, first a hard-boiled, and then a marble egg may be given them to fight with, taking care, at the same time, to prevent their access either to the hen or to any real eggs. Another strange propensity is a passion for sucking each other's blood, which is chiefly exhibited when they are moulting, when they have been known to peck each other naked, by pulling out the new feathers as they appear, and squeezing with their beaks the blood from the bulbs at the base. These fowls being subject to a great heat of the skin, its surface occasionally becomes hardened and tightened; in which cases the hard roots of the feathers are drawn into a position more nearly at right angles with the body than at ordinary times, and the skin and superficial muscles are thus subjected to an unusual degree of painful irritation. The disagreeable habit is, therefore, simply a provision of Nature for their relief, which may be successfully accomplished by washing with warm water, and the subsequent application of pomatum to the skin.

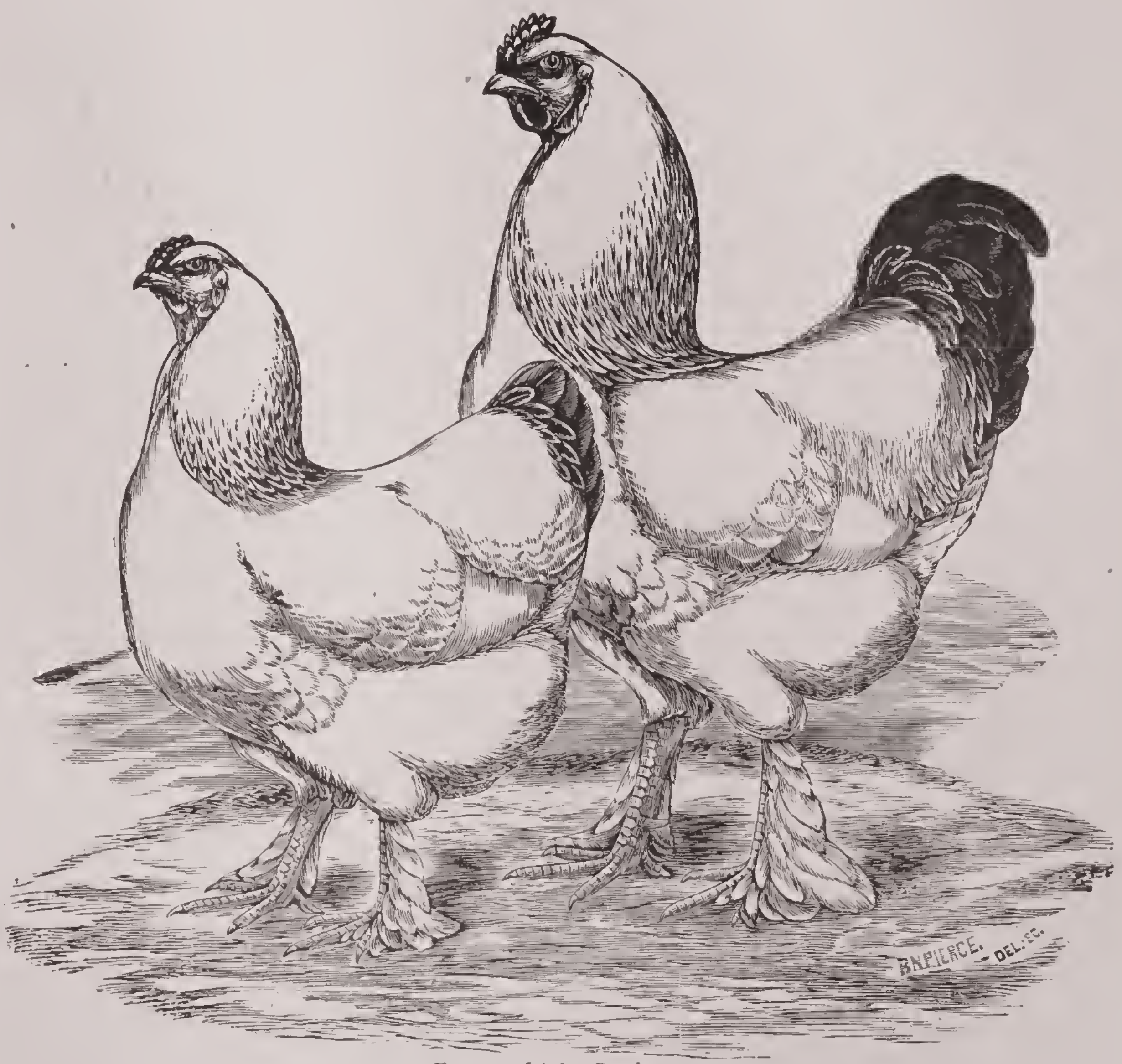

B.N.PIERCE. DEL. SC.

FIG. 2.—*Light Brahmas.*

Bantams, in general, are greedy devourers of some of the most destructive of our insects, the grub of the cock-chafer and the crane-fly being especial favorites with them. Their chickens can hardly be raised so well as by allowing them free access to minute insect dainties; hence the suitableness of a worn-out hot-bed for them during the first month or six weeks. They are thus positively serviceable creatures to the farmers, as far as their limited range extends.

One of the most interesting and beautiful species of Bantams is the Sebrights, of which there are two varieties, the Golden and Silver Sebrights. In the former, of which we give a fine pair on page 526, the ground color is a rich golden yellow; in the latter it is pure white. The carriage of the cock is the most conceited it is possible to conceive of; head thrown back till it touches the nearly upright tail; wings drooping half way down the legs; motion restless and lively, always strutting about as if seeking for antagonists. The bird is, in fact, "game to the back-bone," and will attack the largest fowl with the utmost impudence.

Among the numerous varieties of these beautiful birds, besides the Sebrights, are the Game, Black, White, Nankin, Pekin or Cochin, Cuckoo, and Japanese Bantams.

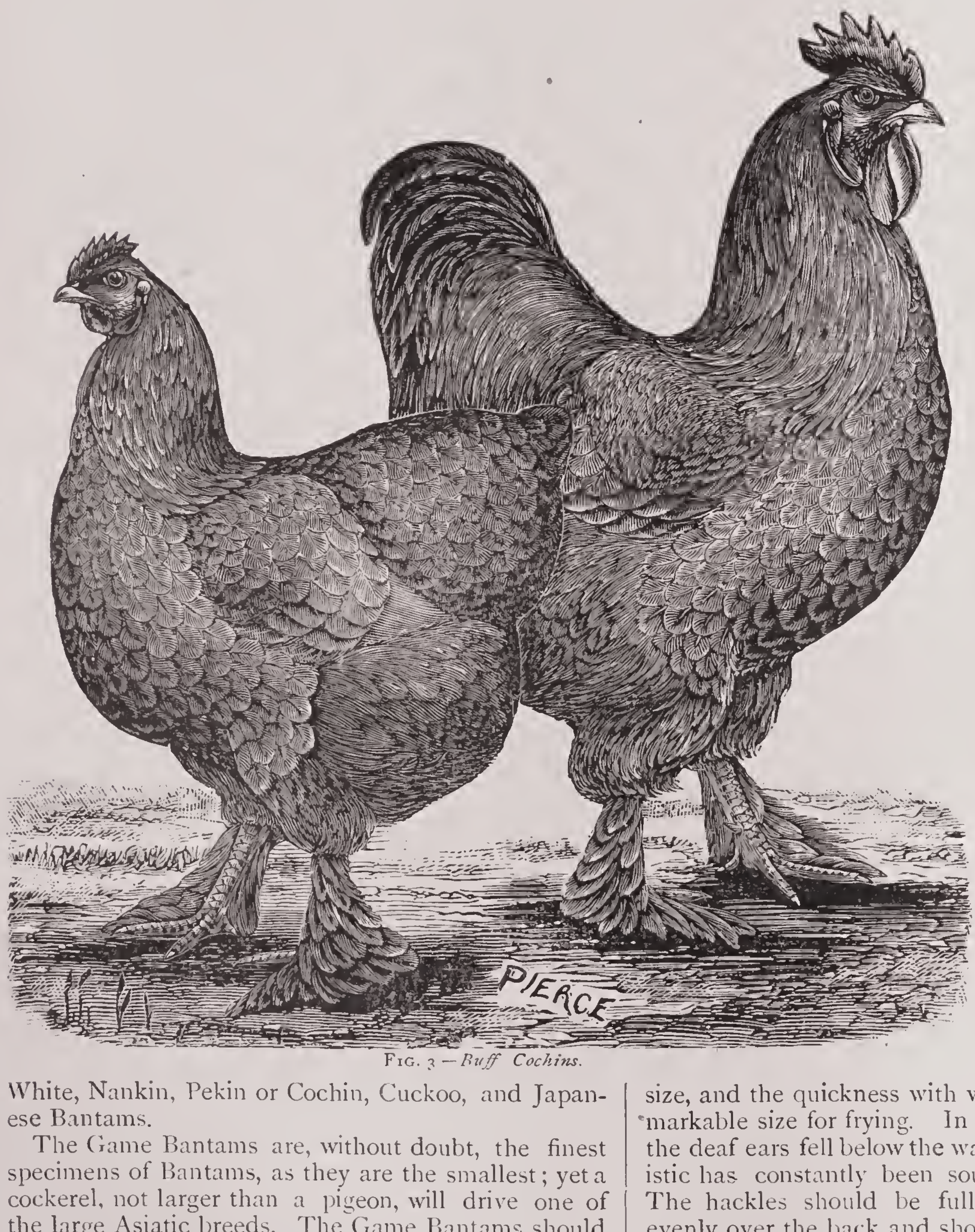


Fig. 3.—*Buff Cochins.*

The Game Bantams are, without doubt, the finest specimens of Bantams, as they are the smallest; yet a cockerel, not larger than a pigeon, will drive one of the large Asiatic breeds. The Game Bantams should be exact and diminutive representatives of the large breed of Games they are to represent, whether Black-Red, Brown-Red, Duckwings or Pile Game Bantams. The smaller these are the better, and to reduce the size it is usual to rear chickens from late fall broods. For competition, cocks must weigh less than 24 ounces, and hens less than 20 ounces each. The plumage of the Game Bantams is precisely similar to the corresponding varieties of the Game Fowl, from which they are undoubtedly obtained by long inter-breeding, and continually selecting the smallest specimens.

The plumage of the Black variety is uniform black, and in the cock has a bright luster like that of the Spanish fowl.

The White are similar to the Black Bantams, except that the legs are white and delicate, and the plumage spotless white.

Nankin Bantam is of a pale orange yellow color, with slight penciling on the hackle. It is a very old breed, but not common.

The Pekin or Cochin Bantams were introduced in England from China not many years ago, having been stolen from the Summer Palace at Pekin during the Chinese war. They exactly resemble Buff Cochins in color and form, possessing the feather-legs, abundant fluff, and all other characteristics of the parent breed in full perfection, and presenting a most singular appearance.

The Japanese Bantam is the most curious of all the different varieties. It is very short-legged and differs from most other varieties in having a very large, single comb.

Brahmas. The Brahmas have long been favorite fowls, from their quiet habits, large size, and the quickness with which they grow to a remarkable size for frying. In all the original breeds the deaf ears fell below the wattles, and this characteristic has constantly been sought to be perpetuated. The hackles should be full and spread well and evenly over the back and shoulders. Vulture hocks, especially, should be well avoided. The backs should be well furnished with soft, curling feathers, and the legs booted (feathered) quite down to the toes. This to apply to pure-bred birds. In the farmyard, where birds are grown simply for market, nice qualifications are not essential, nevertheless the general characteristics should be preserved.

There are two varieties of Brahmas, known as "Light" and "Dark" or "Pencilled" Brahmas; and on no account should they ever be crossed, the result being according to Mr. Teebay, who was formerly the most successful and extensive breeder of Brahmas in England, always unsatisfactory. The following description of Light Brahams have been carefully drawn up under the supervision of John Pares, of England.

"Light Brahmas are chiefly white in the color of the plumage, but if the feathers be parted, the bottom color will often be found of a bluish gray, showing an important distinction between them and the white Cochins, in which the feathers are always white down to the skin. The neck hackles should be distinctly striped with black down the center of each feather. That of the cock is, however, often lighter than in the case of the hen. The back should be quite white in both sexes. The wings should appear white when folded, but the flight feathers are black. The tail should be black in both sexes. In the cock it is well developed, and the coverts show splendid green reflection in light. It should stand tolerably upright and open well out laterally, like a fan. The legs ought to be yellow, and well covered with white feathers, which may or may not be very slightly mottled with black; the vulture hocks are a great defect. The ear-lobes must be pure red, and every bird should, of course, have a perfect pea-comb, though good birds with a single comb have been shown with success."

The dark or pencilled Brahmas are similar to the above in comb, form, symmetry, etc., but as different in color as can well be.

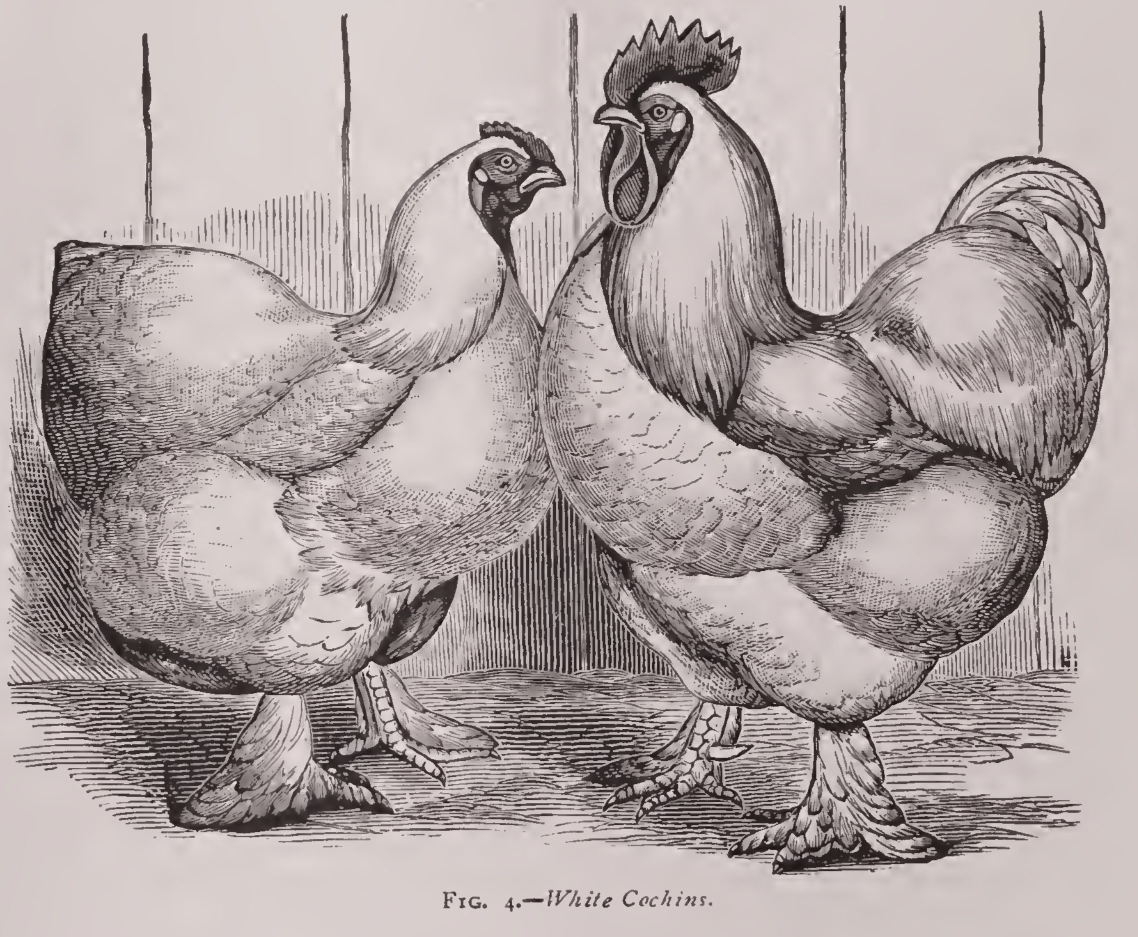


Fig. 4.—*White Cochins.*

The following description of "Dark Brahmas" is by Mr. R. W. Boyle, of Bray, Ireland, who has for some years been known as the most eminent breeder of Dark Brahmas in Great Britain.

The head of a perfect Brahma cock should be surmounted by a good "pea-comb," which resembles three small combs running parallel the length of the head, the center one slightly the highest, but all evenly serrated and straight, and the whole low and set firm on the head. Beak strong, well curved, and the color of horn. Wattles full; ear lobes perfectly red, well rounded, and falling below the wattles. His neck should be rather short, but well curved, with a full hackle, which is silvery white striped with black, and ought to flow well over the back and sides of the breast. At the head, the feathers should be white. Back, very short, wide and flat, rather rising into a nice, soft, small tail, carried rather upright. The back almost white. The saddle feathers white, striped with black, as in the neck, and the longer they are the better. The soft rise from the saddle to the tail, and the side feathers of the tail, to be pure lustrous green black, except a few next the saddle, which may be slightly ticked with white; the tail feathers themselves pure black. The breast should either be black, or black with each feather slightly and evenly tipped with white, but on no account splashes of white; it should be well carried forward, full and broad. Wings small and well tucked up under the saddle feathers, and thigh fluff. "A good sharply defined black bar across the wings is very important. The fluff on the thighs and hinder parts ought to be black or very dark gray. The lower part of the thighs should have plenty of nice soft feathers, almost black, rounding off about the joint and hiding it, but on no account running into 'vulture hocks,' which I consider a great eyesore. The cock should carry himself upright and sprightly, and great width and depth are important points; a good bird should show great size and look big.

"The hen's head should be small, with a perfect pea-comb, as in the cock, but smaller; and the beak also resembling his in the decided curve and color. Wattles quite small and neatly rounded, the red ears hanging below them. Neck short, and gradually enlarging from head to shoulders. Feathers about the head grayish, verging to white, and the hackle more striped with black than in the cock. General make of the back, tail, thighs, wings, and breast the same as in the cock, but, of course, in proportion.

"The color of the hen, except the neck and tail, is the same all over, each feather, even up to the throat on the breast, having a dingy white ground very much and closely pencilled with dark steel gray. The pencilling on the throat and breast is very important, and is one of the first points looked at in a prize hen. The hen's legs are short and thick, not quite so yellow as the cock's, and profusely feathered on the outside with feathers the same color as the body. Her carriage is scarcely so upright as that of the male bird.

"With regard to the economic merits of the Brahmas, the pullets lay when six months old, and usually lay from 30 to 40 eggs before they seek to hatch. They have been known to begin to lay in autumn, and never stop,—let it be hail, rain, snow or storm—for a single day till the next spring."

We present excellent specimens of the Dark and Light Brahmas by Figs. 1 and 2, pages 514 and 515.

BLUE DUN. The variety known under this name originated in Dorsetshire, England. They are under the average size, rather slenderly made, of a soft and pleasing bluish-dun color, the neck being darker, with high, single combs, deeply serrated. The cock is of the same color as the hen, but has, in addition, some handsome dark stripes in the long feathers of the tail, and sometimes a few golden, or even scarlet marks, on the wings. They are exceedingly impudent, familiar and pugnacious.

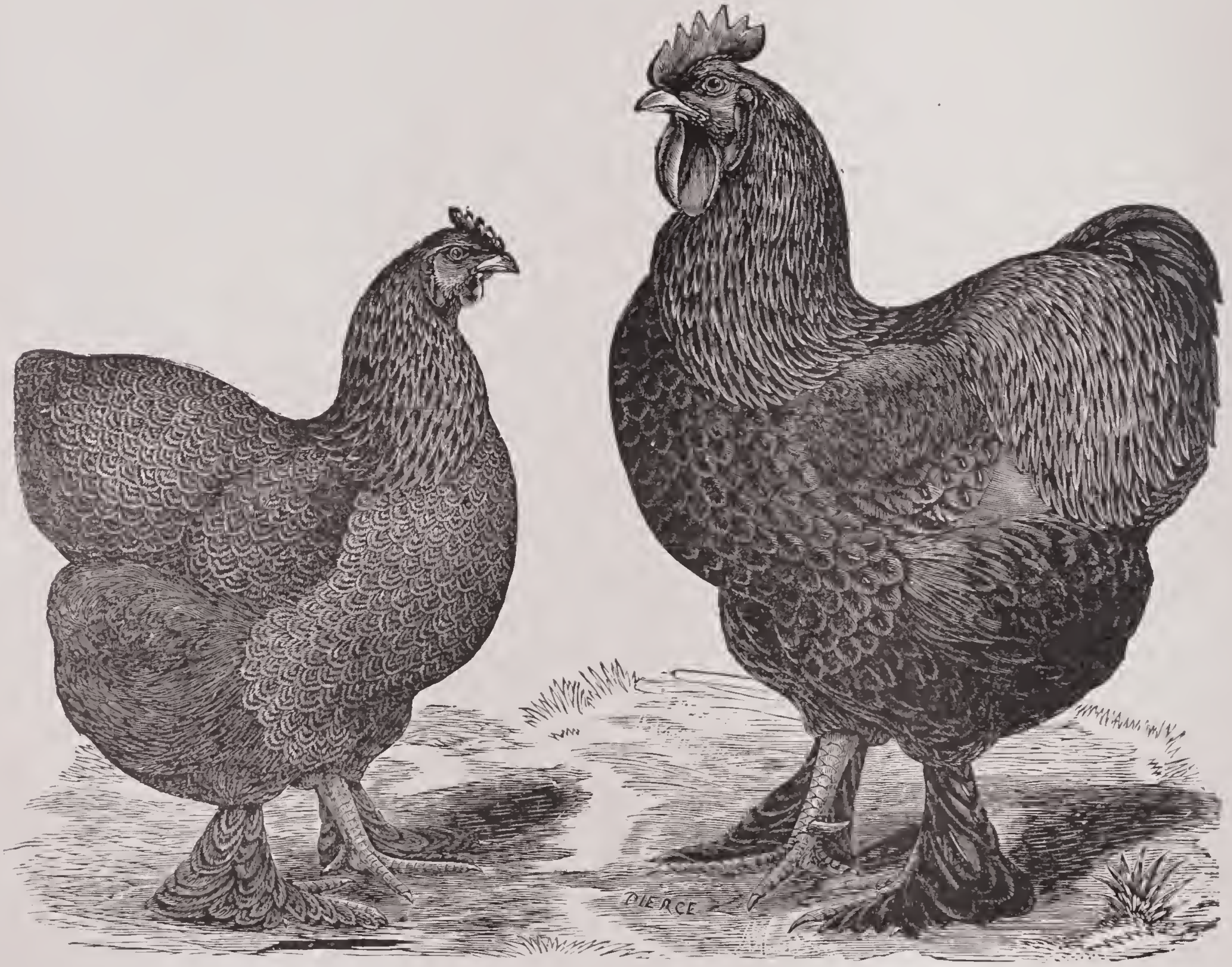


FIG. 5.—*Partridge Cochins.*

The hens are good layers, wanting to sit after laying a moderate number of eggs, and proving attentive and careful rearers of their own chickens, but rather savage to those of other hens. The eggs are small and short, tapering slightly at one end, and perfectly white.

Some authorities class these birds with the Game fowls, not recognizing them as a distinct breed, upon the ground that, as there are Blue Dun families belonging to several breeds, such as the Polish, Spanish, Game and Hamburgs, it is more proper to refer each Blue Dun to its own proper ancestry.

Chittagong. The Chittagong is an Indian breed and the largest variety. It is a very superior bird, showy in plumage, exceedingly hardy, and of various colors. In some the gray predominates, interspersed with lightish yellow and white feathers upon the pullets. The legs are of a reddish flesh-color; the meat is delicately white, the comb large and single, wattles very full, wings good size. The legs are more or less feathered; the model is graceful, carriage proud and easy, and action prompt and determined.

This breed is the largest in the world, the pullets usually weighing from eight to nine pounds when they begin to lay, and the cocks from nine to ten pounds at the same age. They do not lay as many eggs in a year as smaller hens; but they lay as many pounds of eggs as the best breeds. This breed has been, by some, confounded with the great Malay, but the points of difference are very noticeable. There is less offal; the flesh is finer, although the size is greatly increased; their fecundity is greater; and the offspring arrive at earlier maturity than in the common Malay variety.

There is also a red variety of the Chittagong, which is rather smaller than the gray. These have legs sometimes yellow and sometimes blue,—the latter color perhaps from some mixture with the dark variety; the wings and tail are short. Sometimes there is a rose-colored comb, and a top-knot, through crossing. This variety may weigh sixteen pounds a pair, as ordinarily bred. The eggs are large and rich, but not very abundant, and they do not hatch remarkably well.

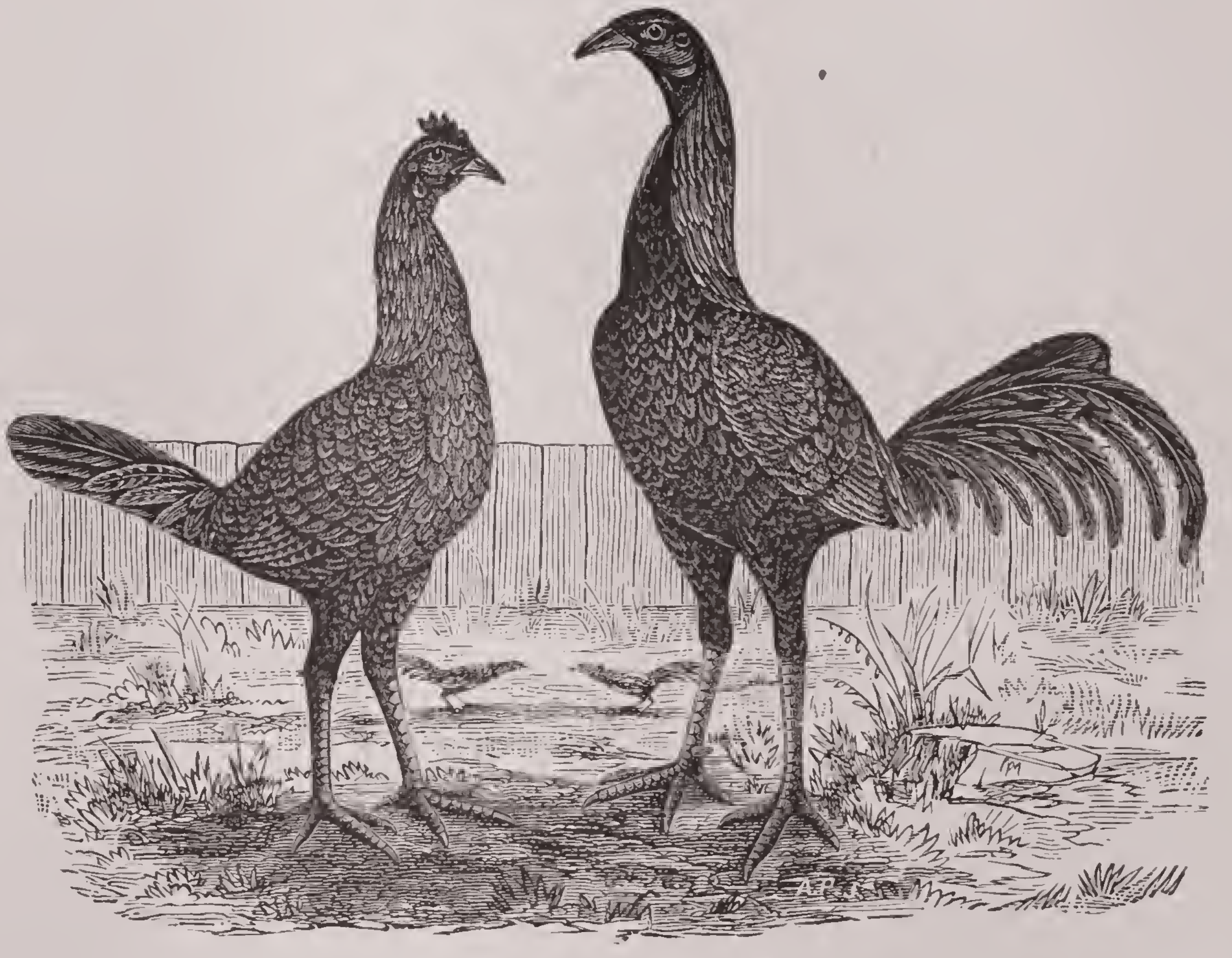


Fig. 6.—*Black-Breasted Red Game.*

The Chittagongs are generally quite leggy, standing some 26 inches high; and the hens 22 inches. A first cross with the Shanghae makes a very large and valuable bird for the table, but not for breeding purposes.

Cochin China Fowls. This breed of fowls was introduced into England from the East Indies in 1843, when they are said to have been presented to Queen Victoria. It was introduced into this country about the year 1847, and to this is mainly due the celebrated "poultry mania" long to be remembered by breeders of domestic fowls. Men became almost wild after Cochins, and were willing to spend a small fortune for a trio of fine birds.

They differ very little in their qualities, habits and general appearance from the Shanghaes, to which they are undoubtedly nearly related. The cock has a large, upright, single, deeply-indented comb, very much resembling that of the Black Spanish, and, when in high condition, of quite as brilliant a scarlet; like him, also, he has sometimes a very large white ear-hole on each cheek, which, if not an indispensable or even a required qualification, is, however, to be preferred, for beauty at least. The wattles are large, wide, and pendent. The legs are of a pale flesh color; some specimens have them yellow, which is objectionable. The feathers on the breast and sides are of a bright chestnut brown, large and well-defined, giving a scaly or imbricated appearance to those parts. The hackle of the neck is of a light yellowish brown; the lower feathers being tipped with dark brown, so as to give a spotted appearance to the neck. The tail feathers are black, and darkly iridescent; back, scarlet-orange; back hackle, yellow-orange. It is, in short, altogether a flame-colored bird. Both sexes are lower in the leg than either the Black Spanish or the Malay.

The hen approaches in her build more nearly to the Dorking than to any other breed, except that the tail is very small and proportionately depressed; it is smaller and more horizontal than in any other fowl.

Her comb is of moderate size, almost small; she has also a small, white ear-hole. Her coloring is flat, being composed of various shades of very light brown with light yellow on the neck. Her appearance is quiet, and attracts attention only by its extreme neatness, cleanliness and compactness.

The eggs average about two ounces each. They are smooth, of an oval shape, equally rounded at each end, and of a rich buff color. The newly-hatched chickens appear very large in proportion to the size of the egg. They have light, flesh-colored bills, feet and legs, and are thickly covered with down. It is most desirable to hatch these, as well as other large-growing varieties, as early in the spring as possible, even as soon as the end of February. A peculiarity in the cockerels is, that they do not show even the rudiments of their tail-feathers till they are entirely full-grown.

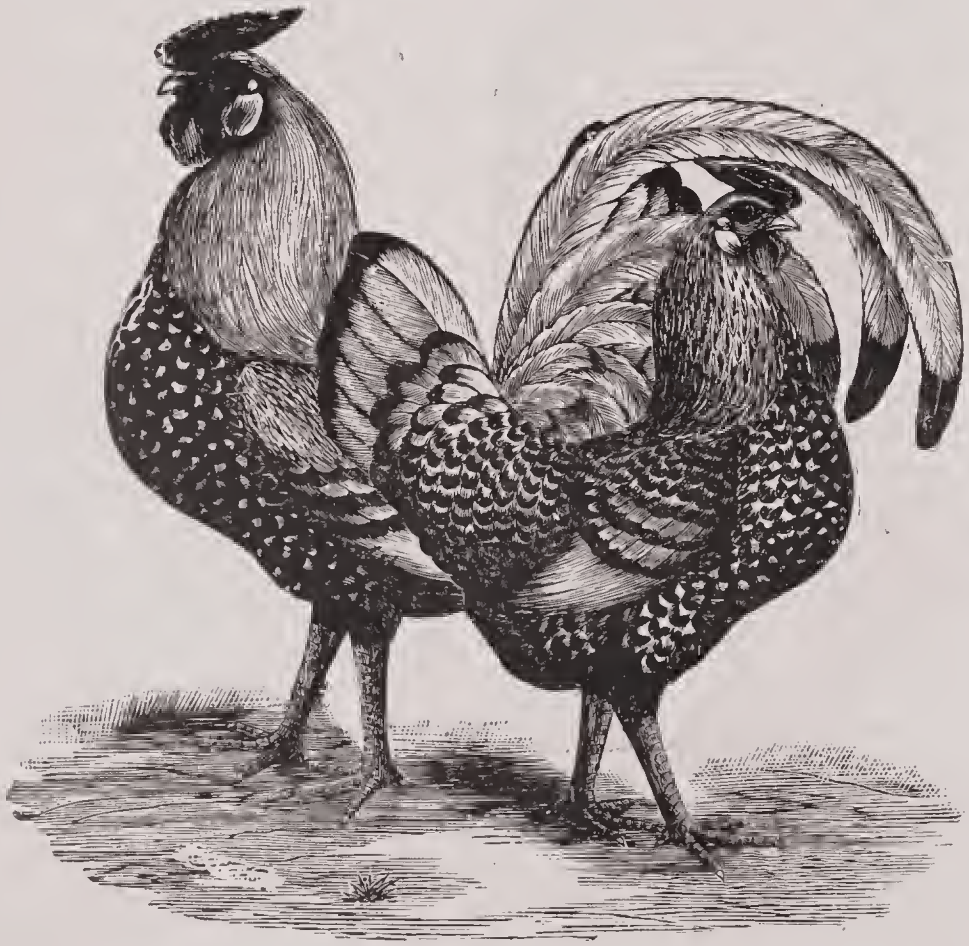


Fig. 7.—*Hamburgs.*

The principal sub-varieties of the Cochins are the White, Buff and Partridge; all of which we most perfectly illustrate. On page 516 we show a fine pair of the Buff Cochins; on page 517 is the White and on page 518 we illustrate fine specimens of the Partridge Cochins. With those who breed the White variety, every feather must be pure; otherwise the fowl is looked upon with disfavor. The Buff Cochins may be of any shade, but the birds in a flock must correspond in color. Among the most admired of the Cochins is the "Partridge" variety. The neck hackles of the hens are bright gold, striped with black, the rest of the body being light brown, pencilled with a darker shade of the same color. The hackles of the Partridge Cochin cock are bright red, striped with black, the back being dark red, with a bar of metallic green upon the wings. The breast and under part of the body are pure black. Some of the points of merit, as claimed by the breeders of these fowls, are as follows: They are hardier than other breeds except the Brahmas, and will thrive under conditions where most others would perish. They are of large size, with a very gentle disposition, and the ease with which the Cochins are kept in confinement makes them favorites with many poultry raisers. When full grown the weight ranges from 10 to 15 pounds; they are too heavy to fly, and a fence two feet high will confine them. As sitters and mothers the hens are not surpassed, and are prolific layers, especially in winter when eggs are scarce. The chickens grow rapidly, and at three months are large enough for eating.

It is true they have many defects. The flesh is inferior, especially of old birds. The inclination to sit sometimes interferes with their greatest usefulness. This tendency is developed by over-feeding. As a breed the Cochins are most useful to supply the demands of a family for early chickens and a plenty of large, rich eggs.

On the farm the White Cochins are sturdy birds, and will forage, if allowed, long distances in search of insects. If kept in confinement they must have animal food, and also green food, daily, and if possible they should be allowed a short ramble late in the afternoon, when they will not trespass much. As winter layers of eggs the hens are among the best of all breeds of Gallinaceous fowls. They also cross kindly with other barnyard fowls, and live contentedly with other breeds. The objection to them is that they are rather coarse-boned and inclined to undue accumulation of fat.

Among the other principal varieties of the Cochin breed are Cinnamon, Lemon, Silver Buff, Silver Cinnamon, Black Cochin, Cuckoo, and Silky-Feathered Cochins.

CREVE-COEURS. This breed has been the longest known in England, and is one of the most preferred in France for the quantity and quality of its flesh. The full-grown cock will not unfrequently weigh 10 pounds, but 7½ to 8 pounds is a good average.

In form the Creve is very full and compact, and the legs are exceedingly short, especially in the hens, which appear almost as if they were creeping along on the ground. In accordance with this conformation, their motions are very quiet and deliberate, and they appear the most contented in confinement of any fowls we know. They do not sit, or very rarely, and are tolerable layers of very large white eggs. The comb is in the form of two well developed horns, surmounted by a large, black crest, and giving the bird a decidedly "diabolical" appearance. Wattles full, and, like the comb, a very dark red. The throat is also furnished with ample whiskers and beard. Plumage mostly black, but in the largest and finest birds not unfrequently mixed with gold or straw on the hackle and saddle. The merits of the Creve consist in its edible qualities, early maturity, the facility with which it can be both kept and reared in confinement, and the fine, large size of its eggs.

DOMINIQUES are probably one of the oldest varieties, being only a fixed type of those "cuckoo" fowls which have always been such favorites. They resemble, in fact, the cuckoo-colored fowls known as Scotch Grays, with the exception of having rose combs and yellow legs. Their combs are generally double, or rose, as it is sometimes called, and the wattles small. Their plumage presents, all over, a sort of greenish appearance, from a peculiar arrangement of blue and white feathers, which is the chief characteristic of the variety, although, in some specimens, the plumage is inevitably gray in both cock and hen. They are very hardy, healthy, excellent layers, and capital incubators. No fowl has better stood the test of mixing without deteriorating than the pure Dominique.

The name is taken from the island of Dominica, from which they are said to have been imported. Take all in all, they are one of the very best breeds of fowl which we have; and although they do not come into laying so young as the Spanish, they are far better setters and nursers.

DORKINGS. This is a pre-eminently English breed of fowls, and is, as it always will be, a general favorite—especially with lady fanciers. Its flesh is extremely delicate, especially after caponization; and it has the advantage over some other fowls of feeding rapidly and growing to a very respectable size, when properly managed.

The varieties of Dorkings usually recognized are the Gray or Colored, Speckled, Silver Gray, and White. For those who wish to stock their poultry yards with fowls of the most desirable shape and size, clothed in rich and variegated plumage, and, not expecting perfection, are willing to overlook one or two other points, the Speckled Dorkings should be selected. Dorkings are peculiarly subjected to "bumble foot," a chronic gathering, or abscess, probably first produced by the heavy birds descending to the ground from too high perches; but now it appears more or less hereditary in the breed; at least we have seen it repeatedly in fowls never allowed to roost high enough to cause it in this way, and which had the unrestricted run of a spacious park. We believe there is no remedy but to let the abscess grow to maturity and then remove it surgically. The operation will be successful about once out of three times.

The great merit of Dorkings has already been hinted at and consists in their unrivaled excellence as table fowls. In this respect we never expect to see them surpassed. The meat is not only abundant and of good quality, but is produced in greatest quantity in the choicest parts. The hens, in addition to their gay colors, have a large, vertically flat comb, which, when they are in high health, adds very much to their brilliant appearance, particularly if seen in bright sunshine. The cocks are magnificent. The most gorgeous hues are lavished upon them, which their great size and peculiarly square-built form display to the greatest advantage. Their legs are short, their breast broad, there is but a small proportion of offal, and the good, profitable flesh is abundant. The cocks may be brought to considerable weight, and the flavor and appearance of their meat are inferior to none. The eggs are produced in reasonable abundance, yet the Dorking is not a good layer, except when very young, and in winter is even decidedly bad in this respect. Though not equal in size to Spanish hens, they may fairly be called large.

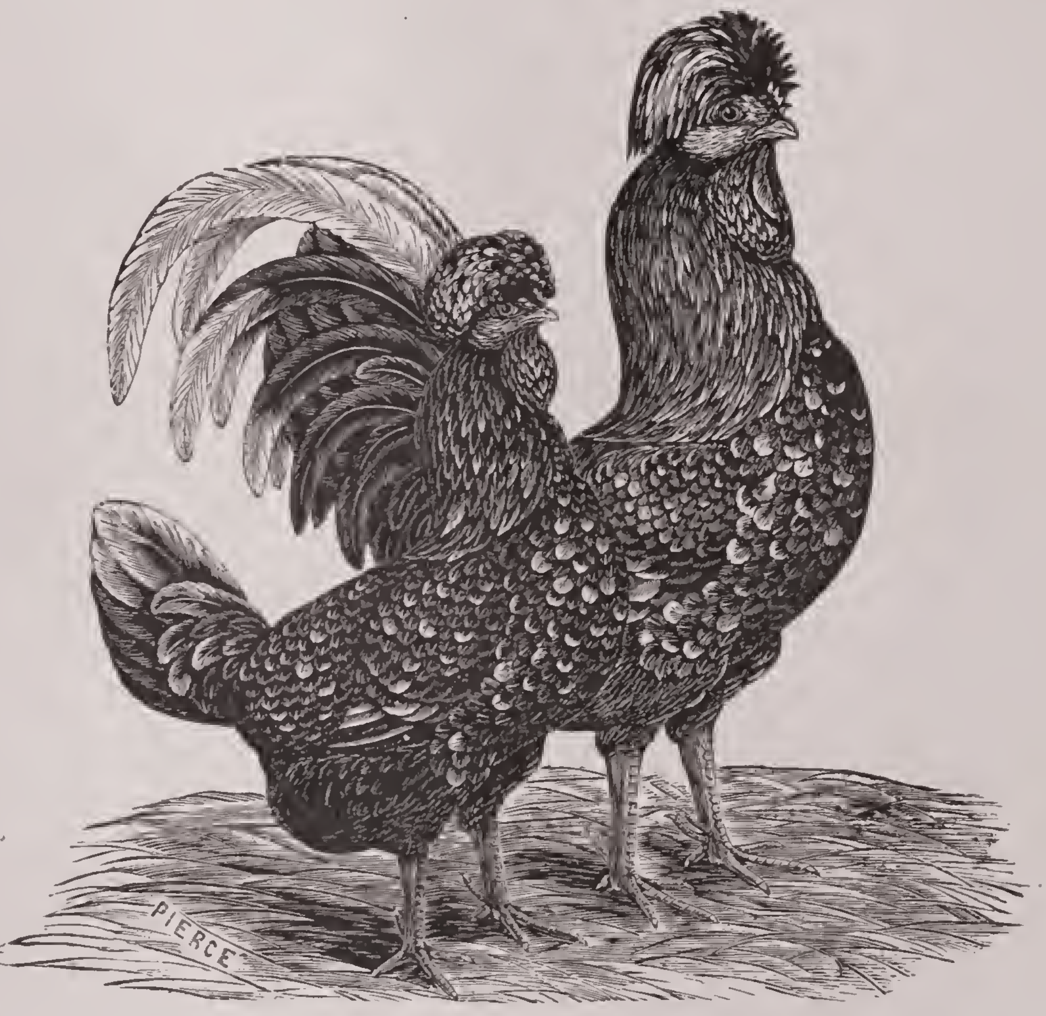


FIG. 8.—*Houdans.*

The Fawn-colored Dorking is a cross between the

White Dorking and the Fawn-colored Turkish fowl. They are of lofty carriage, handsome and healthy.

The Black Dorkings are of a large size with the usual proportions of the race, and of a jet black color. The neck feathers of some of the cocks are tinged with a bright gold color, and those of some of the hens bear a silvery complexion.

Dunghill Fowl. This is also known as the barndoor fowl. It is a mongrel breed and may be found of all colors. It is known by having a thin, serrated, upright comb, and wattles hanging from each side of the lower mandible. The tail rises in an arch above the level of the rump. The female's comb and wattles are smaller than those of the cock; she is less in size and her colors more dull and somber.

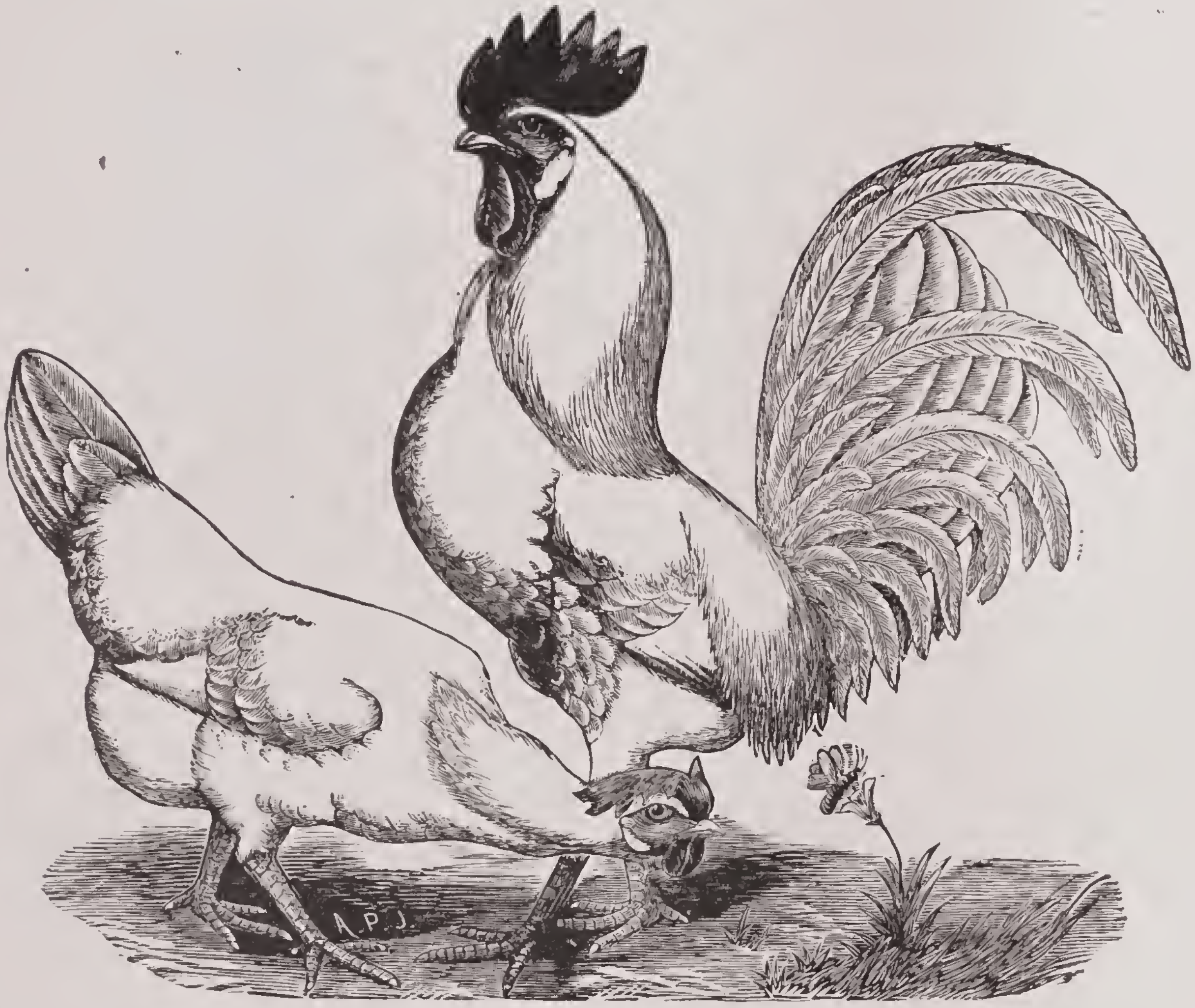


Fig. 9.—*White Leghorns.*

Game Fowl. The flesh of this fowl is beautifully white, and superior to that of any other variety in richness and flavor. They are also the most elegant and intelligent of the gallinaceous tribe of barnyard fowls. The hens are excellent layers, and although the eggs are under the average size, they are not surpassed in excellence of flavor. Such are the excellent characteristics of this fowl; yet it is not a desirable breed for the farmer on account of its pugnacious disposition and the smallness of the size of both birds and eggs. The pugnacious disposition of these little birds often manifests itself as soon as they are freed from their shell. Their one great mission of life seems to be to fight, and they take to it as readily and with as much relish as they do to the little morsels of meal given them. A brood is scarcely feathered before at least one-half are killed or blinded by fighting.

It is probable that these fowls, like other choice varieties, are natives of India. It is certain that in that country an original race of some fowl exists at the present day, bearing in full perfection all the peculiar characteristics of the species. In India, as is well known, the natives are infected with a passion for cock-fighting. These fowls are carefully bred for this barbarous amusement, and the finest birds become articles of great value. In Sumatra the inhabitants are so much addicted to the cruel sports to which these fowls are devoted, that instances are recorded of men staking not only their property upon the issue of a fight, but even their wives and children. The Chinese are likewise passionately fond of this pastime; as, indeed, are all the inhabitants of the Indian countries professing the Mussulman creed.

The Romans introduced the practice into Britain, in which country the earliest recorded cock-fight dates back to about the year 1100. In Mexico and the South American countries it is still a national amusement.

The varieties are numerous and there are many sub-varieties, often having but a local celebrity. So the English, Irish, Malta, Cuban, Mexican, Spanish, all claim special celebrity, while in the South the Georgian are held to be the most superior in point of plumage, shape, carriage, hardiness and courage, as they are generally admitted to be superior in the quality of the eggs and flesh. Among fanciers for the pit the Derby and Duck-wing Games are regarded as among the best of the Games.

The Brown-Reds have long been most perfect in outline; but the following description will apply to a perfect bird of any breed:

The beak should be strong, curved, long and sharp; the comb single, small, and thin, low in front, erect and evenly serrated: it is usually red, but sometimes darkish red; head long and sharp, with the face and throat lean and thin; ear-lobes small and red, never whitish; neck long, strong and well arched; the hackle short, hard, close, firm, and broad in the feather; back short, and very hard both in flesh and feather; broad at shoulders, narrow at tail, and round at the sides; breast broad and very hard, but by no means too lean or too full,—the last would be useless weight; a good, hard breast is most essential, as it is the most valuable part of the bird; wings very strong, and of a just medium length, well rounded to the body, and carried neither low nor high, but so as to protect the thighs. Very long-winged birds are usually too long in the body, and short-winged birds are too short in the stern. Tail neither long nor short but medium length, and carried erect to show good spirit, but not "squirrel fashion" over the back; it should be well "fanned" or spreading, and the sickle feathers of a good, round, full curve, and standing clearly above the points of the quill tail-feathers. Very long-tailed birds are soft and long-bodied, and short-tailed birds are too short-winged, and often have broad rumps. Thighs short and very muscular, hard and firm; placed well wide apart and well up to the shoulders, in order to give a fine forehand and make the bird stand firm on his legs,—which latter should be sufficiently long, but not too much so, and be placed wide apart as the thighs. Spurs low down, long, sharp, and rather thin; a little curved upwards, and not turned in too much; feet flat, broad, spreading, and thin; the claws and nails long and strong; the back claw especially long and flat to the ground, to give a firm footing. The whole plumage should be very close, short, and hard, with glossy reflections, and the quills or stems strong and elastic. Body in hand short and very hard, and the general carriage upright, quick, fierce and sharp.

The back is best rather curved, provided it be flat crosswise and not hump-backed or lop-sided. Weight for exhibition 4½ to 5½ pounds; for the pit not over 4½ pounds.

The hen should correspond in form, but of course in proportion, hardness of flesh and feather, with shortness of body, being main points. Good hens generally become spurred, and such breed the hardiest and best cocks. The proper weight of the hen is from 3 to 3½ pounds. This breed is illustrated with beautiful specimens of the Black-breasted Red Game on page 519.

GUELDERLAND. The Guelderland fowls were originally imported into this country from the north of Holland, where they are supposed to have originated. They are very symmetrical in form, and graceful in their motions. They have one noticeable peculiarity, which consists in the absence of a comb in either sex. This is replaced by an indentation on the top of the head; and from the extreme end of this, at the back, a small spike of feathers rises. This adds greatly to the beauty of the fowl. The presence of the male is especially dignified, and the female is little inferior in carriage.

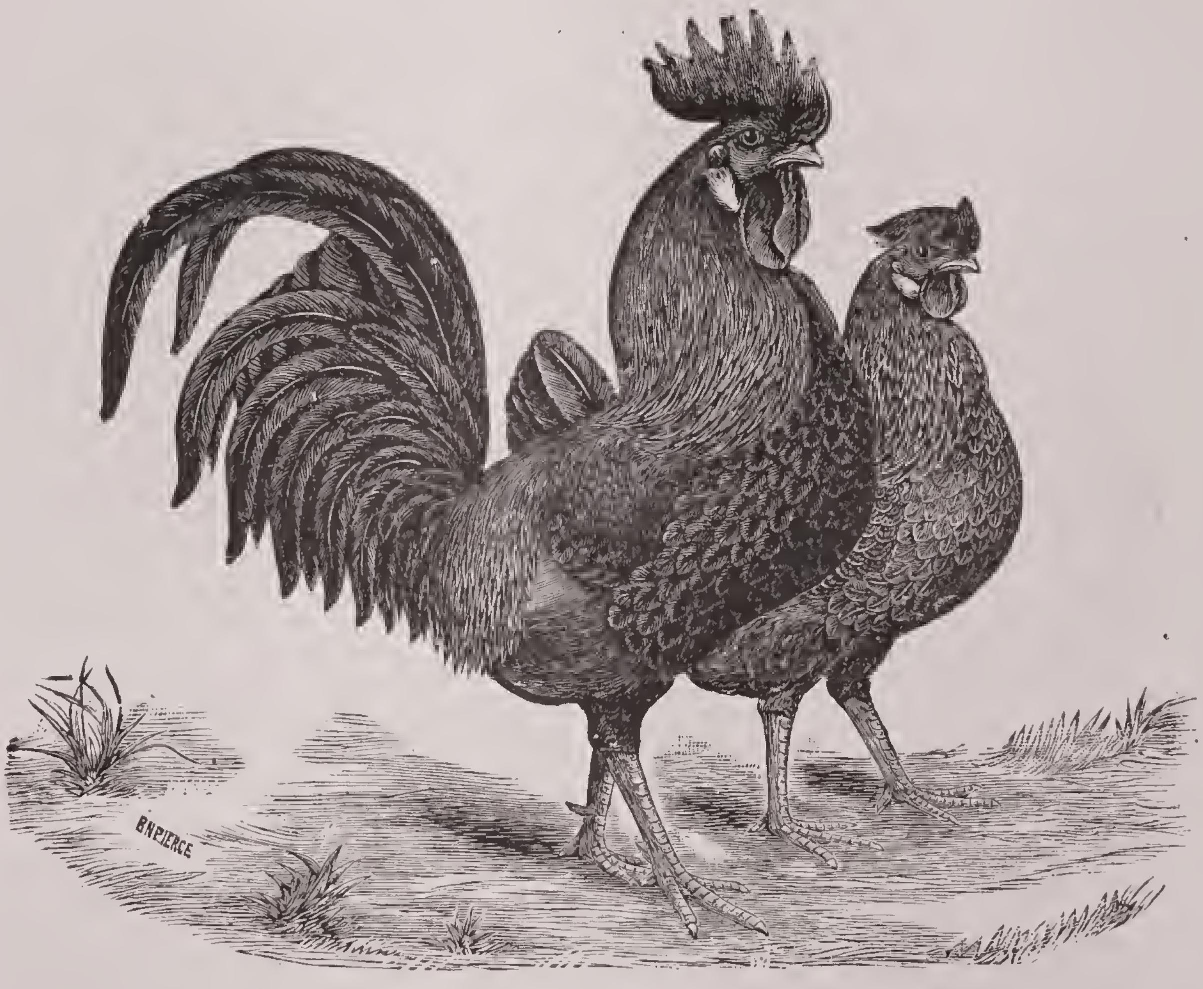


FIG. 10.—*Brown Leghorns.*

The plumage is of a beautiful black, tinged with blue, of very rich appearance, and bearing a brilliant gloss. The legs are black, and, in some few instances, slightly feathered. Crosses with the Shanghae have heavily feathered legs. The wattles are of good size in the cock, while those of the hen are slightly less. Flesh is fine, of white color, and of excellent flavor. The eggs are large and delicate—the shell being thicker than in those of most other fowls—and are much prized for their good qualities. The hens are great layers, seldom inclining to sit. Their weight is from five pounds for the pullets to seven pounds for the cocks.

HAMBURG. Under the name of Hamburgs, which are also called Bolton Grays, Dutch Every-day Layers, Penciled Dutch Fowls, Chittaprats and Creoles, are now collected several varieties of fowls, presenting the general characteristics of rather small size, brilliant rose combs, ending in a spike behind, projecting upwards, blue legs, and beautifully penciled or spangled plumage. None of the Hamburgs ever show any disposition to sit unless in a state of great freedom, but lay nearly every day all through the year except during the molting season; whence they are called Dutch Every-day Layers. They are small-sized, short in the leg, and plump in the make; color, of the genuine kind, invariably pure white in the whole cappel of the neck; the body white, thickly spotted with black, sometimes running into a grizzle, with one or more black bars at the extremity of the tail. A good cock of this breed may weigh from 4 to 4½ pounds; and a hen from 3 to 3½ pounds. The general contour of the body of this bird is well illustrated by the specimens shown on page 520.

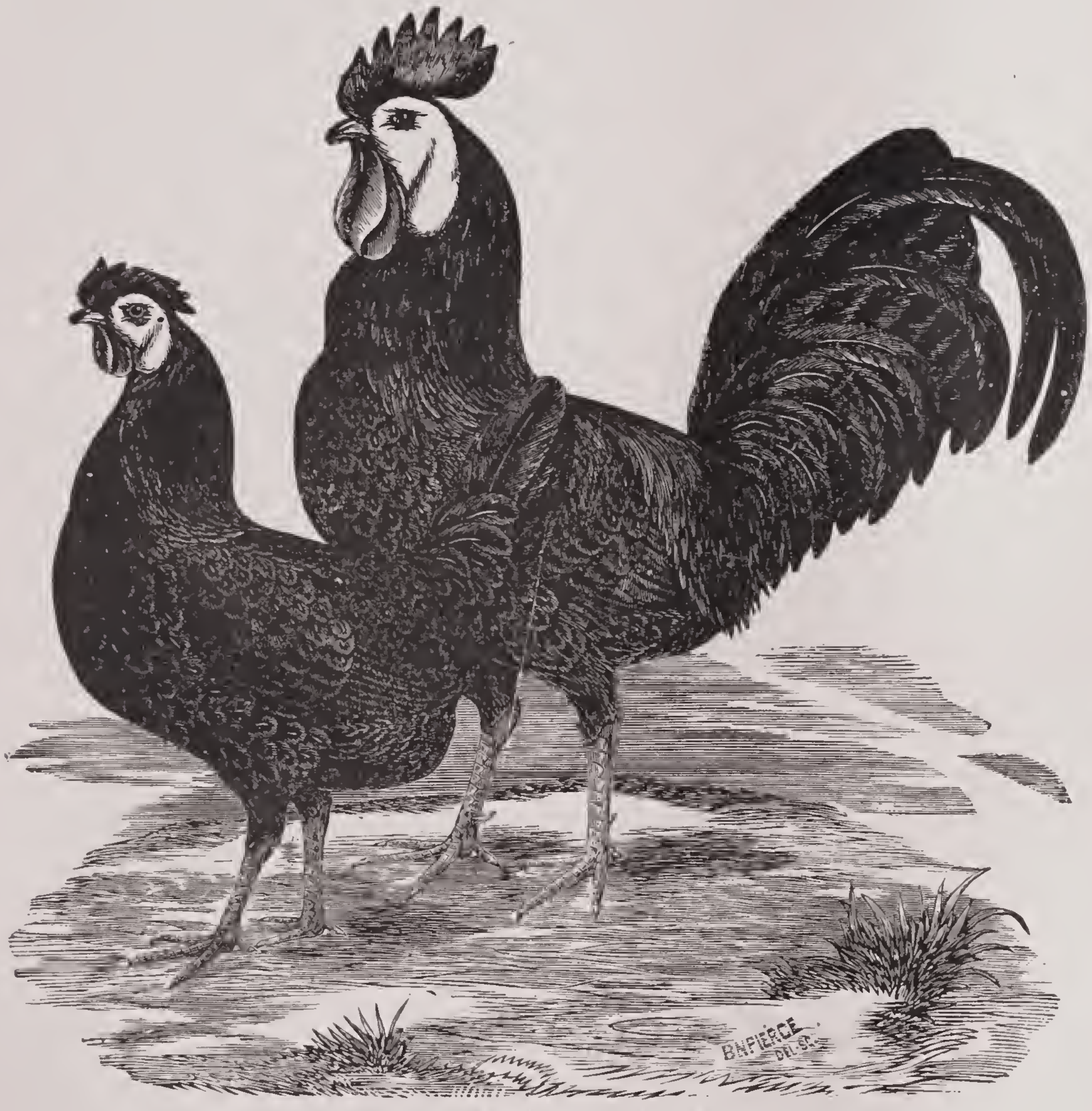

B.N.PIERCE DEL. SC.

FIG. 11.—*White-faced Black Spanish.*

The superiority of a hen of this breed does not consist so much in rapid as in continued laying. She may not produce as many eggs in a month as some other kinds, but she will, it is claimed, lay more months in the year than probably any other variety. They are said to be very hardy; but their eggs, in the judgment of some, are rather watery and innutritious.

HOUDANS. This is one of the French breeds that have been introduced into the United States. In France, the Houdans are bred in as high estimation as are the Dorkings in England, being noted there for the excellence and quantity of eggs laid, and as excellent in their flesh. They are supposed to have descended from the Dorking and Padone fowls, and, like the Dorkings, they should have the fifth toe. This characteristic is not constant, but is required in all fowls for exhibition purposes. The color is white and black, evenly mixed. Occasionally stained feathers will appear, but red ones should never be tolerated. The head is crested, the comb double-leafed, giving the birds a rather fierce look, which is heightened by the whiskers and beard, growing well up on the face of both cock and hen. The legs are spotted leaden gray, and the weight of the fowls medium. Altogether, there are many inferior breeds to this one, and they are certainly as handsome as they are agile and able to take care of themselves. They are represented by a fine engraving on page 521.

LA FLECHE. In appearance this breed resembles the Spanish. It excels that breed, however, in size, the cock weighing from eight to even ten pounds. Both sexes have a large, long body, standing on long and powerful legs, and always weighing more than it appears, on account of the dense and close fitting plumage. The legs are slate color, turning with age to a leaden gray. The plumage resembles the Spanish, being a dense black with green reflections. The look of the head is peculiar, the comb being not only two-horned much like the Creve, near the top of the head, but also appearing in the form of two little studs or points just in front of the nostrils. The ear-lobes are dead white, like the Spanish, and exceedingly developed, meeting under the neck in good specimens. In fact, no breed could show stronger traces of its Spanish origin. The hen is an excellent layer of very large white eggs, and does not sit. The flesh is excellent. The breed is, however, very delicate, and does not lay well in winter.

LANGSHANS. This is a breed but recently introduced into this country. Those who have bred them are enthusastic in their praise, claiming that for egg production, for table and for hardihood, to say nothing of their magnificent plumage and large size, they are unequaled by any of the Asiatic or large breeds.

LEGHORNS. Those who breed fowls principally for eggs must not expect to have an abundance of eggs and flesh combined in one fowl. The specialty the Leghorns are noted for is mainly eggs; it is not superior as a table fowl; neither are they inferior in this particular. We look to the French, whom we have always credited with fine taste in such matters, and find they consume thousands of Leghorns every week, being shipped from the port of Leghorn to Marseilles. They are bred of various colors, except black, but the White and the Brown are the most fashionable. The White variety much resembles the Spanish in size and plumage, but are their direct opposite in color. They are precisely like the Brown Leghorns except in color.

The Brown Leghorn, p. 523, is the product of Italy, but at present has the colors and markings of the Black-breasted Red Game and the non-sitting traits of the Leghorn. The form and style of comb, wattles and other features were long ago fixed, but it is due to American breeders to have accomplished uniformity in the breed, while possessing gay plumage and lively appearance, which are both pleasing and attractive.

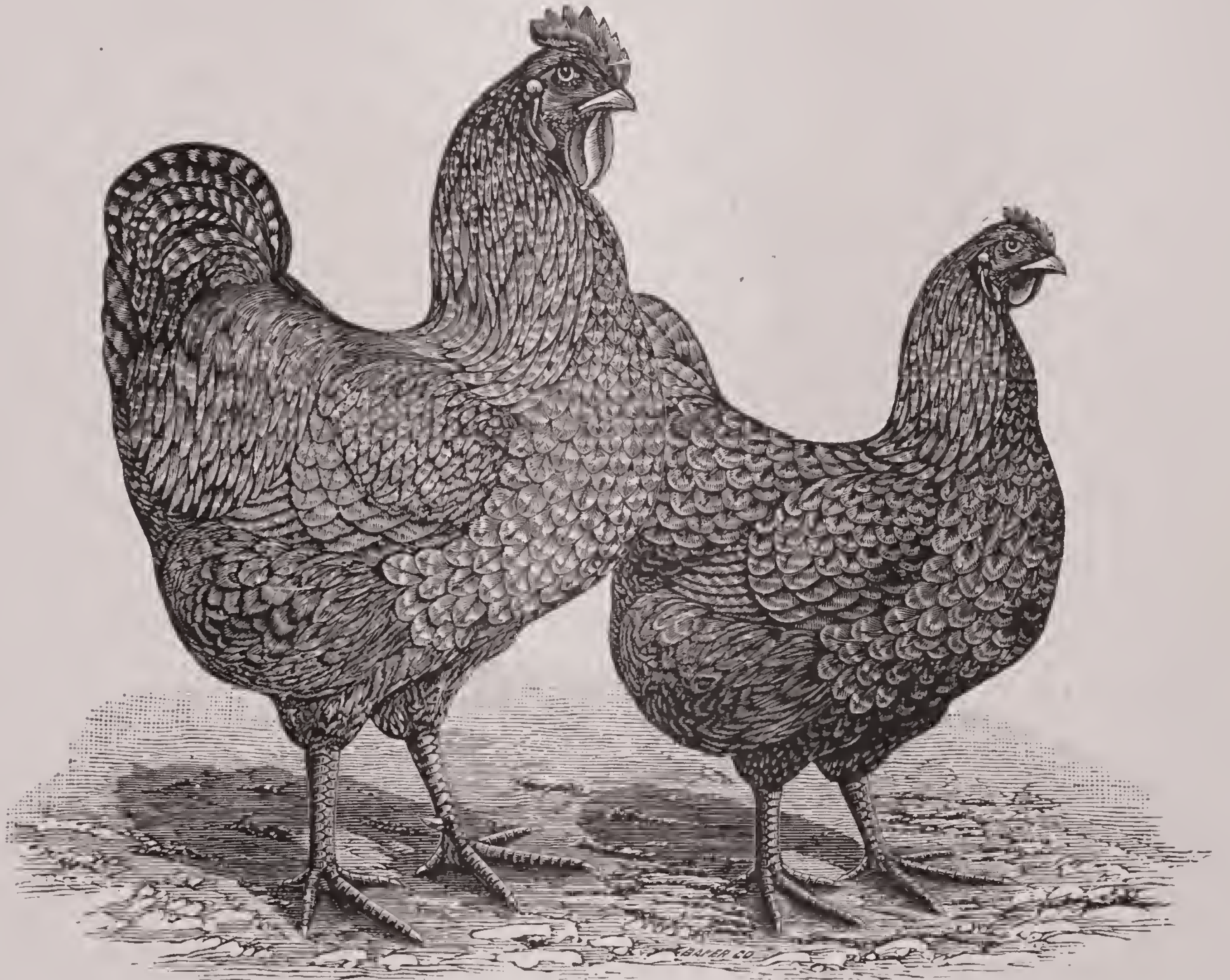


FIG. 12.—*Plymouth Rocks.*

All the varieties of the Leghorn family should possess combs, wattles and ear-lobes of the same shape and color. Preference is given to a comb the tips of which describe a perfect arch. The wattles should be pendulous, and if one edge folds over a little all the better. The ear lobes should be smooth and even and be flat on the face, the lower end should not be too pointed but maintain its width toward the bottom pretty well.

If the Leghorns have warm, comfortable houses in which to put them early in the evening, and not permitted to go out in very cold, freezing weather, but little trouble need be feared in wintering them successfully. They love freedom, it is true, and are rovers and free-booters by nature. It is their activity, necessarily the healthy exercise they take while on the move in quest of worms, grubs and whatever they fancy, that develops their great productiveness. The pullets mature early; some often lay between four and five months old. The chicks feather out when very young, looking like Bantams, so neat in feathering, lively and precocious. Those who have had experience with Leghorns claim that the little brown hen excels all others in egg productions, coquettish style, and lively carriage.

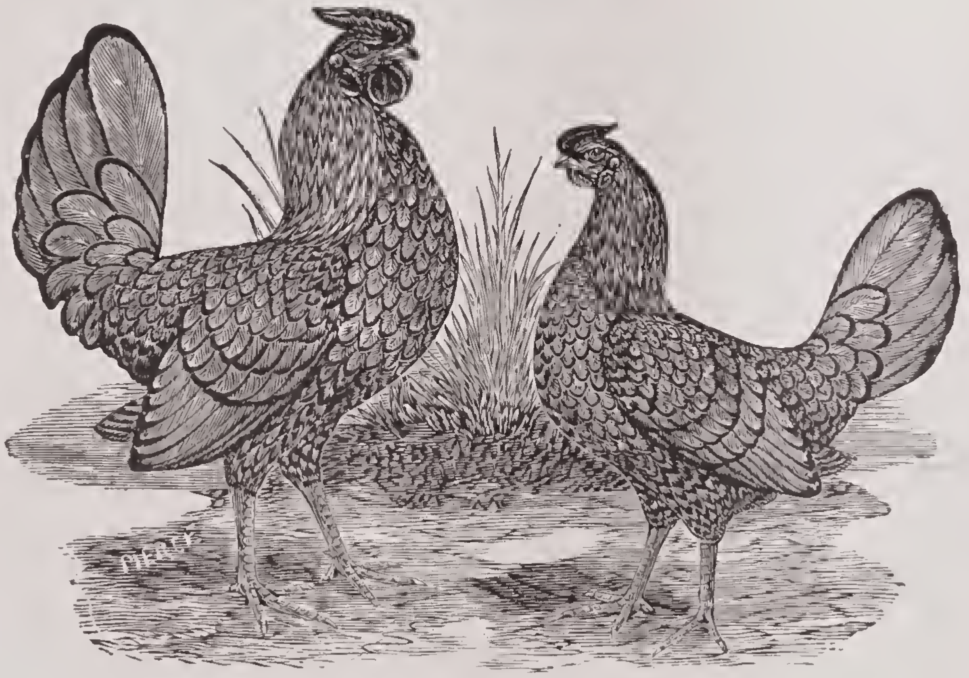


Fig. 13.—*Golden Sebright Bantams.*

Plymouth Rock is one of the most, if not the most, popular breeds of the present day. It combines within itself all of the essential properties that contribute to make a breed pre-eminent, and which are justly sought by both the fancier and the farmer. As to the origin of the breed, nothing definite can positively be said. Much discussion has been engaged in on this point. As a breed they are very hardy and vigorous; as rapid growers, or early maturity, they are perhaps without a rival, when we consider its size and quality of flesh. Another excellent characteristic is productiveness; and as for table quality they rank high. At a little more than a year old the cocks stand from 32 to 35 inches high, and weigh about 10 pounds; and the pullets from 6½ to 7 pounds each. The latter commence laying when five months old. Their eggs are medium in size, and of a rich, reddish-yellow color. In plumage they are rich and variegated. The hens are of a darkish-brown and the cocks generally red or speckled. Their legs are very large and usually blue or green, but occasionally yellow or white. They generally have five toes upon each foot. Some have their legs feathered, but this is not usual. They have large and single combs and wattles, large cheeks, rather short tails and small wings, in proportion to their body. We give a fine illustration (page 525) of this breed, from which these characteristics may plainly be seen.

The mating of Plymouth Rock fowls to produce that uniformity of coloring desired for exhibition purposes is a vexed point with the average fancier of this breed. The points most desirable to perpetuate and for which all Plymouth Rock breeders are striving to attain are the evenly barred plumage, the yellow legs and beak, the fine single comb, and the size and weight.

The uniform shade of color in both sexes is difficult to obtain. The strong Indian blood which makes the hens so dark must have a share in determining the shade of the plumage. This must be looked for at present in the Plymouth Rock pullets, as the tendency to reversion to the original color comes through one sex, and tend to persist in that sex alone.

It is almost impossible to blot out entirely the dark feathering or shading of plumage which comes from a union between a hawk-colored blue or bluish-gray cock, and a black hen of tropical origin. Fowls of the Dominique plumage have already "black blood" in their make-up; and as the tendency to variation in color is always greater in the male bird, all breeds whose plumage contains an admixture of light and dark markings will naturally produce males whose color will average lighter than the females.

Southern Asiatic fowls of black plumage, mated with any light-colored cock, will usually show the dark pigment in the pullets, while the cockerels may be comparatively free from this coloring.

The Southern Asiatic fowls have sprung from the old Malabar stock, and always had Malay or Papuan influence at work in fixing their characteristic traits and features. Yellow legs and beaks on black or dark fowls are rare, and we assert without fear of contradiction that in the whole Malay Peninsula, excepting perhaps one or two varieties in the island of Singapore (of Chinese origin), not one fowl in a hundred has bright yellow legs and beaks.

The majority of Plymouth Rock pullets have more or less spots or specks on their legs, and many have been exhibited the past two years that had these blemishes, being good or above the ordinary average in color, size and markings. When the pullets come handsome in color their legs usually incline to dusky yellow or greenish where the dark specks occur, and the beaks are similar in shade. The cockerels tend to light plumage from the same mating but usually with a more desirable color of limb and beak clearly and cleanly defined.

Now, what would be the natural course to pursue in mating Plymouth Rock fowls to conform to Standard requirements? The Standard calls explicitly for yellow legs; yet it is well known that but few of the many pullets reared from this stock show this desirable color. The Standard also calls for a plumage of bluish gray, penciled across with bars of darker blue. We find in matching them in the show coop that the cock and hen must be of the same, or very near the same, shade of color to comply with its requirements. But the general experience of Plymouth Rock breeders is, that matching them for the exhibition room and mating them for breeding to produce the "happy medium" in color and other desired points are two different things.

The Plymouth Rocks are domestic in their habits and not so destructive to gardens as smaller fowls.

POLANDS. Under the title of Polands, or Polish fowls, should be collected all varieties which are distinguished by a well-developed crest, or tuft of feathers on the top of the head.

White-crested Black. This is the most generally known of all the varieties. The carriage of the cock, as in all Polands, is graceful and bold, with the neck thrown rather back towards the tail; body short, round and plump; legs rather short, and in color rather black or leaden blue. There should be no comb, but full wattles of a bright red; ear-lobes a pure white. Plumage black all over the body, with bright reflections on the hackle, saddle and tail. Crest large, regular and full, even in the center, and each feather in a perfect bird we suppose of a pure white; but there are always a few black feathers in front, and no bird is therefore to be disqualified on that account, though the fewer the better. Weight from five to six pounds. Hen very compact and plump in form. Plumage a deep, rich black. Crest almost globular in shape and in color like the cocks. See above engraving.

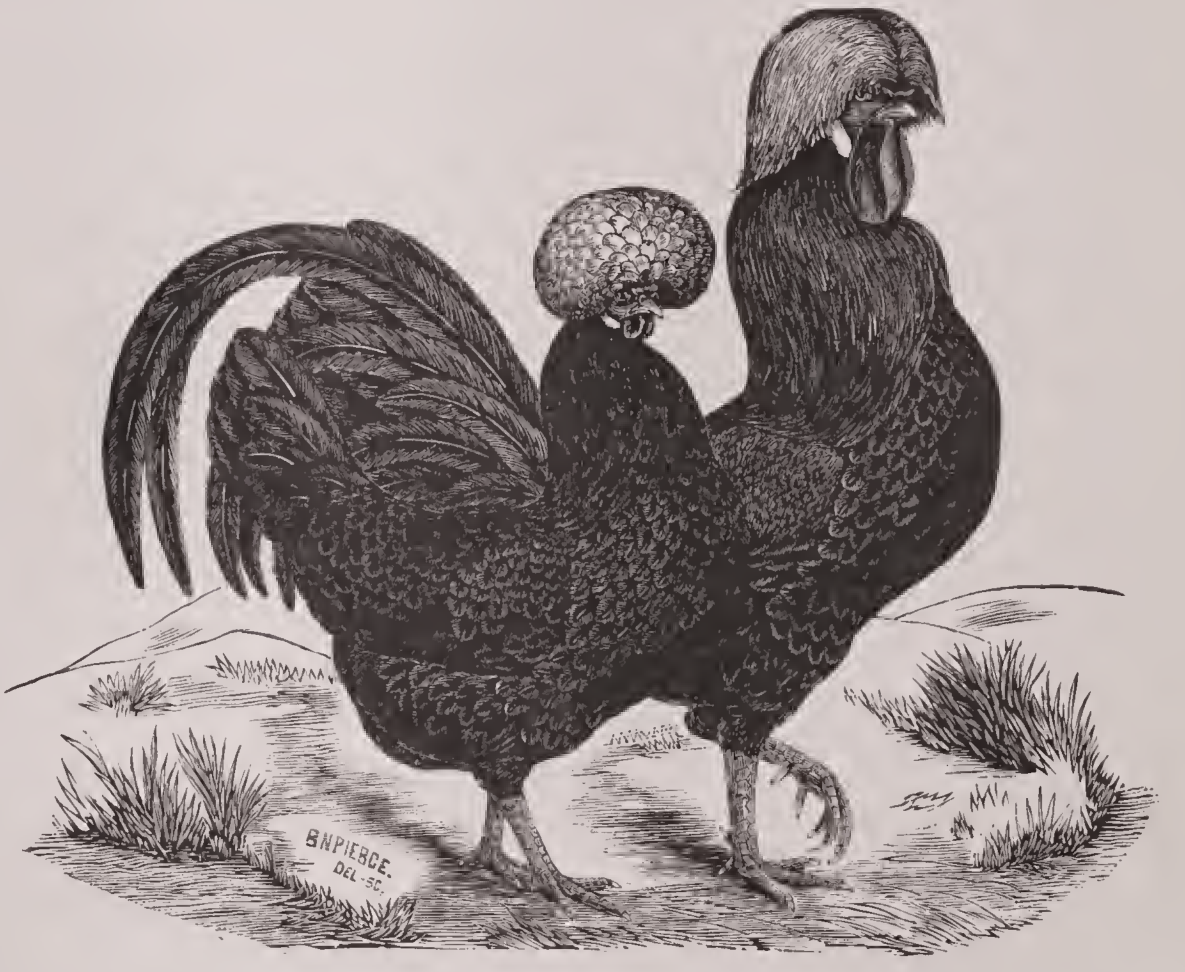


FIG. 14.—*White-crested Black Polands.*

White-crested White. This breed, and those which follow, differ from the White-crested Black Polands not only in greater hardihood, but in having a well-developed beard under the chin, in lieu of wattles. They are large, fine birds, and the crest is finer and more perfect than in most other colors. They are also among the best in point of laying. The plumage needs no description, being pure white throughout.

Silver Spangled. In this variety the ground color of the plumage is a silver white, with well-defined, moon-shaped black spangles.

Golden Spangled. This breed is similar to the preceding in the black markings, substituting a rich golden ground for the silver white.

Polands have certainly solid merits. They improve in appearance, at least up to the third year. In a favorable locality they are most prolific layers, never wanting to sit, and the flesh is remarkably susceptible of attachment to their feeders. Their great fault is a peculiar tendency to cold and roup—the White-crested Black being the most delicate of all. The dense crest becomes, during a shower, saturated with water, and the fowls are thus attacked in the most vital part. No birds are so affected by bad weather. In exposed or damp situations they will die off like rotting sheep, and it is hopeless to expect any return. They can only be kept successfully in warm, genial situations, on well drained ground, with a chalk or sand sub-soil, and with ample shelter to which they can resort during showers. In such circumstances they will do well and repay the owners by an ample supply of eggs.

SHANGHAE. For all the purposes of a really good

A TABULAR STATEMENT OF THE CHIEF QUALITIES OF FOWLS, DUCKS, GEESE AND TURKEYS.

BREEDS.	Live weight of Cock in pounds.	Live weight of Hen in pounds.	Age at maturity in months.	Cost of raising to maturity.	Annual cost of keeping.	Average number of eggs laid per year.	Average number of eggs to the pound.	Constitution.	As Foragers.	Can they endure confinement?	As Layers.	As Sitters.	As Mothers.	Grain of Flesh.	Flavor of Flesh.	Distinguishing Colors.	Breeders' average prices per trio.	Color of Legs.
Brahmas, light	11½	8	24	$1 50	$ 90	150	7	Average	Poor	Yes	Fair	Heavy	Clumsy	Average	Fair	White	$ 7—15	Yellow
Brahmas, dark	10½	7	24	1 50	90	150	8	Hardy	Fair	Yes	Fair	Heavy	Clumsy	Fine	Good	Black	7—15	Yellow
Cochins, black	10	7	24	1 50	90	170	9⅝	Hardy	Good	Yes	Good	Fair	Fair	Average	Fair	Black	7—15	Yellow
Cochins, buff	10	7½	24	1 50	90	120	8	Average	Poor	Yes	Poor	Heavy	Fine	Coarse	Poor	Buff	7—15	Yellow
Cochins, white	11	9	24	1 50	90	140	8	Average	Poor	Yes	Fair	Good	Fine	Coarse	Poor	White	7—15	Yellow
Cochins, partridge	11	8	24	1 50	90	150	8	Average	Poor	Yes	Fair	Good	Heavy	Average	Fair	Red, black	7—15	
Common	3½	3	12	1 00	75	160	11	Average	Good	Yes	Fair	Good	Good	Fine	Good	None		White
Dorkings	6½	5	18	1 25	90	120	9	Tender	Good	No	Poor	Good	Good	Fine	Best	Diverse	10—15	Yellow
Dominiques, American	5	4	12	1 25	90	170	10	Hardy	Good	No	Good	Good	Good	Fine	Good	Slaty-blue	7—15	Willow
Games, black-breasted red	7½	5	12	1 00	75	170	10	Hardy	Best	No	Fine	Fine	Best	Fine	Good	Red, black	6—12	Various
Hamburgs	4	3	12	80	75	180	12	Tender	Good	No	Good	Non	Poor	Fine	Poor	Diverse	6—10	
Houdans	7½	5	20	1 25	1 00	170	9	Average	Good	No	Fair	Non	Poor	Fine	Best	Broken b'k, white	6—12	
Leghorns, black	4½	3½	12	75	75	200	10	Hardy	Fine	No	Best	Non	Poor	Average	Poor	Deep black	5— 9	Yellow
Leghorns, brown	4½	3½	12	75	75	200	10	Hardy	Fine	Yes	Best	Non	Poor	Average	Poor	Golden bay, black	5— 9	
Leghorns, dominiqe	4½	3½	12	75	75	200	10	Hardy	Fine	Yes	Best	Non	Poor	Average	Poor	Slaty-blue	5— 9	
Leghorns, white	4½	3⅜	12	75	75	200	8	Hardy	Fine	Yes	Best	Non	Poor	Average	Poor	Pure white	5— 9	
Plymouth Rocks	8½	6⅝	18	1 50	90	175	8⅝	Hardy	Good	Yes	Good	Fair	Good	Fine	Good	Bluish-gray	6—12	Blue
Polish	5½	3⅜	14	1 00	75	170	9	Tender	Good	No	Good	Non	Bad	Fine	Poor	Diverse	8—15	
Spanish, black	7	6	18	1 00	80	170	9⅝	Tender	Good	No	Good	Non	Bad	Coarse	Poor	Golden-black	6—12	
Dominique, English	9½	7⅝	..								Fair	Heavy	Fair	Average	Fair	Gray		Slate
Creve-coeurs			14				6	Tender		Yes	Fair	Poor		Fair	Good	Black and var		Bl'k or blue
LaFleche	9	7	..			170	9⅜	Tender			Good	Non		Fine	Good	Greenish-black		Yellow
Polands, white-crested	4	3	..				9⅝	Hardy	Good		Good	Non		Fine	Good			Dark slate
Malay			..					Hardy						Average	Good	Various		
Langshans	10		14					Hardy		Yes	Good			Fine	Best			
Ducks, common	3	3	6	75	1 00	90	9	Hardy	Good	Yes	Fair	Good	Good	Fine	Fair	Diverse		
Ducks, Aylesbury	7	6	18	1 00	1 00	80	6	Tender	Good	No	Fair	Poor	Poor	Fine	Extra	Pure white	10—15	
Ducks, Cayuga	6	5⅝	15	90	1 00	100	8	Hardy	Poor	No	Good	Good	Good	Fine	Extra	Lustrous black	7—10	
Ducks, Pekin	6	5⅝	18	1 10	1 00	75	8	Hardy	Poor	No	Fair	Good	Good	Coarse	Fair	Creamy-white	7—13	
Ducks, Rouen	7½	6⅝	24	1 10	1 00	80	6	Hardy	Fair	No	Fair	Poor	Good	Fine	Fair	Variegated	10—15	
Geese, common	8	7	12	1 25	1 50	20	4	Hardy	Fine	No	Fair	Good	Good	Fine	Fair	White		
Geese, African	20	18	24	1 75	2 00	30	4	Hardy	Poor	No	Fair	Poor	Bad	Coarse	Poor	Gray	10—15	
Geese, Egyptian	7	6	12	1 00	1 50	40	4	Tender	Fair	No	Fair	Poor	Bad	Fine	Fair	Gray, black	8—12	
Geese, Embden	18	15	30	1 75	2 00	20	3⅝	Tender	Fair	No	Fair	Poor	Bad	Fine	Good	Pure white	10—15	
Geese, Toulouse	22	20	36	2 00	2 00	40	3⅝	Tender	Fair	No	Fair	Poor	Bad	Fine	Good	Gray	12—20	
Turkeys, common	12	10	12	1 20	1 50	50	7	Tender	Fine	No	Fair	Good	Good	Fine	Fair	Diverse		
Turkeys, black	15	12	18	1 75	1 75	50	6	Tender	Fine	No	Fair	Good	Good	Fine	Fair	Rich metallic bl'k	7—12	
Turkeys, bronze	24	15	36	2 00	2 00	50	6	Tender	Fine	No	Fair	Poor	Good	Fine	Fair	Dark bronze	7—12	
Turkeys, buff	15	12	24	1 75	1 50	50	7	Tender	Fine	No	Fair	Good	Good	Fine	Fair	Pure buff	7—12	
Turkeys, Narragansett	22	14	30	1 75	1 75	50	6	Tender	Fine	No	Fair	Poor	Good	Fine	Fair	Metallic black	8—15	

fowl, for beauty of model, good size and laying qualities, the thorough-bred Shanghae is among the best, and naturally the most profitable of domestic birds. The cock, when full grown, stands about 28 inches high, if he is a good specimen; the female about 22 or 23 inches.

The color is usually reddish-white, flesh-color, or reddish-yellow, mostly covered down the outside, even to the ends of his toes, with feathers. This last, however, is not always the case. The plumage of the thorough-bred is remarkably soft and silky, or rather downy, and is, in the opinion of many, fully as good for domestic purposes as that of the goose. The feathers are certainly quite as fine and soft if not as abundant.

In laying qualities the pure Shanghae equals, if it does not excel, any other fowl. The Black Poland, or the Bolton Gray, may perhaps lay a few more eggs in the course of a year, in consequence of not so frequently inclining to sit; but their eggs are not so rich or nutritious. The eggs are generally of a pale yellow, not remarkably large compared with the size of the fowl, and generally blunt at the ends.

The flesh of the fowl is tender, juicy and unexceptionable in every respect. Taking into consideration the goodly size of the Shanghae, weighing, as the males do, at maturity, from 10 to 12 pounds, and the females from 7½ to 8½, and the males and females of six months eight and six pounds respectively, the economical uses to which its soft, downy feathers may be applied, its productiveness, hardiness, and quiet and docile temper, this variety must occupy, and deservedly so, a high rank among our domestic fowls, and the more it is known the better will it be appreciated.

The *White Shanghae*. This variety is entirely white, with the legs usually feathered, and differ in no material respect from the Red, Yellow, and Dominique except in color.

Spanish Fowl is a noble race of fowls, possessing many merits: of spirited and animated appearance; of considerable size; excellent for the table, both in whiteness of flesh and skin and also in flavor; and laying exceedingly large eggs in considerable numbers.

The thorough-bred birds should be entirely black, as far as feathers are concerned; and when in high condition, display a greenish, metallic luster.

The combs of both cock and hen are exceedingly large, of a vivid and most brilliant scarlet; that of the hen droops over upon one side. Their most singular feature is a large white patch, or ear-hole, on the cheek—in some specimens extending over a great part of the face—of a fleshy substance, similar to the wattle; it is small in the female, but large and very conspicuous in the male. This marked contrast of black, bright red, and white, makes the breed of the Spanish cock very handsome.

The merit of Spanish fowls is their production of large white eggs, which are laid in great abundance in moderate weather. They are also of very good quality as table birds. But they cannot be called good winter layers, unless with the aid of artificial heat; and their delicacy of constitution is a great drawback to their otherwise many merits.

Table. In the further treatment of the domestic fowl, so much depends on the kind, or variety, that we give on the preceding page a condensed statement of their chief qualities. Only an average is attempted in that chart or table, for the whole country. Different circumstances in the various localities will of course produce various results. The cost of raising and keeping are calculated for large lots of fowls, where all the food and care has to be paid for. It will be observed that for all purposes combined, the Plymouth Rock variety leads, especially in the country, while the Brahma is best for the city, where space is limited. Some prefer the Game; the Light Brahmas, Dominiques and White Leghorns, are next in profitableness. For laying alone, the Leghorns and Hamburgs take the lead; for sitting, the Cochins; for large eggs, the Black Spanish, Houdans, Creve-cœurs; for flesh, the Creve-cœurs and Dorkings; for hardiness, the Brahmas, Houdans, Hamburgs, Creve-coeurs, Spanish and Leghorns; for quietude, Brahmas and Cochins; and for size of birds, Brahmas, Cochins, Houdans, etc.

Feeding. It has been demonstrated that without the grinding action of the gizzard what is termed the gastric juice in fowls is unable to dissolve the food they eat. Therefore, before the food is prepared for digestion it must be subjected to a grinding process, the gizzard serving as the mill. It is then pressed by the action of the muscles into the intestines. The power of the gizzard to pulverize substances is remarkable. It is sufficient to pulverize hollow globules of glass in a very short time; and solid masses of glass within a few weeks are dissolved. Needles, and even lancets, given to turkeys, have been broken in pieces and voided, without apparent injury to the stomach. It is the prevailing idea that fowls, through some deficiency in the digestive apparatus, are obliged to resort to the use of stones and gravel in order that they may dispose of the food they eat. Some regard the use of these pebbles is to sheath the gizzard in order to prepare it to break up the hard substances which might be swallowed. Some have supposed the action of these to be of a medicinal nature; others that they act as absorbents for undue quantities of acid in the stomach, or as stimulants to digestion, while some have even regarded them as furnishing nutrition. It has, however, been established by repeated experiments that they are not at all necessary to the trituration of the hardest substances they may eat, and of course the ordinary food does not require their aid to bruise it. These stones, however, do serve a useful purpose. When put in motion by the muscles, they produce some effects upon the contents of the stomach; thus assisting to grind the grain, separating its parts, it is more easily acted upon by the gastric juice.

A judicious system of feeding is necessary for the welfare of poultry; fowls will not pay if starved, and if over-fed they will become fat, lazy and useless both for breeding and laying; besides, when in the latter condition they are more susceptible to disease.

Kinds of Food. There are many kinds of grain used as food for poultry, but in the main, corn seems to be the staple diet used in this country. Through the influence and diffusion of poultry literature, we are taught to regard dietary influences as a matter of real importance, as they affect the health of fowls and also their productiveness. All kinds of grain, if sound, have certain constituent properties, but they differ in nutritive value, which varies with their chemical composition; some tend to growth, some to fattening, and some to egg production. Oats and barley, which are rich in protein compounds, are best adapted to develop muscular tissue and growth in young fowls. Corn, which is specially rich in oils, is best adapted for heating and fattening, and for this purpose has no equal among all our grains. Wheat and buckwheat, being rich in gluten and albumen, are best adapted for egg production. Rye, although a wholesome grain, is not much relished by either young or old fowls, and if used at all, should be ground and combined with other grain. Bran and middlings are largely used as food, but middlings alone is too sticky, and fowls do not like it. Good middlings and wheat bran mixed with oatmeal or corn-meal added, and scalded with boiling water or milk, makes an excellent food, and may be given once a day with good advantage the year through. Milk in any form is good for young or old fowls, and no better use could be made of this valuable article than by feeding it to the young chicks.

The amount fed should be just as much as they will eat up promptly, and no more. The mid-day meals of those which are pent up should be rather light. Their diet, like man's, needs to be constantly varied. The morning meal should generally be meal or middlings and bran, in equal proportions, especially when eggs are wanted. This material should be be barely moistened, so that it will readily crumble as it falls. In winter it should be warm. In the evening the dry grain is generally fed. Soft food is best dealt out in troughs that are protected by cages, the slats being just far enough apart to let their heads through. This measure is to keep the food clean. Feeding from the hand develops affection toward the keeper, but it is thought that the practice leads the fowls to over-eat. Feed young chicks every two or three hours, and at longer intervals as they grow older. Do not feed them meat more than two or three times a week, and this in lieu of insects. More flesh than this is said to make them weak. Hard-boiled eggs are good for chicks.

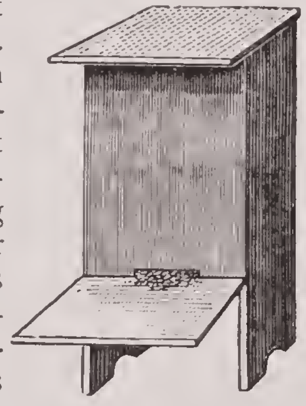


Fig. 15.—*Chicken Feeder.*

Automatic chicken-feeders are in use, an example of which is illustrated by the above cut. Apertures for the outlet of the grain can be made on all four sides of the box. Inclined false bottoms or a pyramid should be placed in the box, so that all the grain put in at one time may be eaten up before replenishment.

Feeding for Rapid Growth. In order to secure rapid growth in the young chicks, it is the common experience of all successful breeders to feed them often, say every two or three hours, until they are three or four weeks old, and at longer intervals as they grow older. Very young chicks cannot consume enough at one time to last them a half day, as their crops are small; their rapid growth of flesh, bone and feathers, and habitual exercise demand material proportionably nourishing and active to develop a vigorous constitution. The feed should be of the very best, not necessarily strong and highly stimulating, but of a kind and quality that will cause a healthy growth. Some breeders feed chopped meat to their chicks very profusely from the shell upward. But this practice has its attending evils. A little flesh meat a few times a week, in the absence of insect food, is good; but if fed too freely to the tender birds when young, it often brings on weakness of the limbs, etc. In addition to their regular diet of grain, green onion tops chopped fine and mixed with their food is highly relished and will be found conducive to their health. Thick sour milk and curds of milk make an excellent food. Pepper and ginger with a little salt occasionally in their soft feed will give to the chicks a relish for their food, variety being absolutely necessary to the highest state of health and the most rapid growth. Chickens, when confined in coops or limited runs, so that they can get no food except what is furnished them, must be supplied with good food, scraps from the table, bone meal and vegetables in variety, as this is a law of their nature, and should not be forgotten by those who expect to be successful in rearing poultry.

Fattening Fowls. The best food for fattening poultry is sweet, fresh oatmeal or barley meal, mixed either with scalding milk or water. Cooped fowls should be supplied with fresh food three times a day, namely: at daybreak, or as soon after as possible, at mid-day, and again before dusk; as much as they can eat should be given to the fowls on each occasion, but no more than can be devoured with promptness; should any be left, it should be removed, and given to the other fowls, as if kept it is apt to become sour, when the birds will not eat it freely. Should the birds be required very fat, some mutton suet or trimmings of the loins may be chopped up and scalded with the meal, or they may be boiled in the milk or water preparatory to its being poured over the food, and the fat of fowls so fattened will be found exceedingly firm. In the course of about a fortnight to three weeks at the utmost, a fowl will have attained, under this system of feeding, the highest degree of fatness of which it is capable, and it must then be killed; for if the attempt be made to keep it any longer in that state, it becomes diseased from an inflammatory action being established, which renders the flesh hard and even unwholesome. When the fowls have arrived at a state fit for killing, they should be kept for twelve or fifteen hours without food or water, in order that the intestines may be as empty as possible; otherwise the bird turns green and useless in a short time.

Water. It is as necessary for fowls to have water constantly as for any other animal. It should be absolutely clean and fresh, and in the winter it should also be warm, say between 80° and 100°. In the winter and early spring it is well to give them copperas water, that is, water with just enough copperas in it to give it a slight mineral taste; or there may be given them the "Douglas Mixture," a teaspoonful to each pint of water in the fountain. This mixture consists of 1 pound of copperas and 1 ounce of sulphuric acid to 2 gallons of water. This is especially good during the moulting season, and is good to keep off the roup and to act as a general tonic. Or, instead of the above, in the spring, one-fourth of a pound of sulphur may be mixed in a pail of feed, and fed once a week.

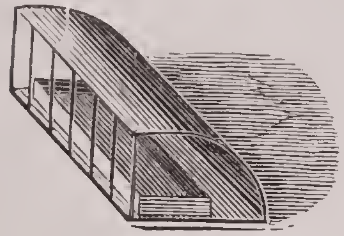


FIG. 16.—*Chicken-Feeder.*

Variety of Food. In either the natural or domesticated state, gallinaceous birds like a variety of food, as it is necessary for the growth of body, bone, and feathers, and also for enriching the blood and developing the organs of production. The habits of fowls in a state of nature are without doubt the best guide. By watching them one can see how industriously they pick up the creeping worm or grub, the flying insect or bug, the tender blades of grass, the seeds and tares, the various kinds of .grain or carrion if they can procure them. The constituent properties of the egg, the framework of the body, the mechanical action of the gizzard, the vital organs, etc., are made up and sustained not alone from the nutritious parts of corn, barley, wheat, or oats, but also from other things which we might consider to be trifles. In winter fowls require a varied diet to do well. It must not be forgotten if we expect them in early spring to have full vigor and be productive, that the necessary articles must be provided. The common practice of feeding corn day after day through the winter without its being supplemented with vegetable and other kinds of food is a very injudicious course to pursue. Corn is a cheap and good grain for fattening and keeping up the animal heat, but in other respects it is inferior to good oats, wheat and barley for laying and breeding fowls. Any one kind of grain will not satisfy or fulfill the requirements of the animal economy, and poulterers should strive to procure a liberal supply of different kinds for their fowls, and feed in rotation as they need them.

In addition to their regular food it will be needful that the fowls have a supply of lime in some shape or other to form the shells of their eggs. Old mortar pounded is excellent; so are oyster-shells well-burnt in the fire and pulverized; of the latter they are very fond, and it is an excellent plan to keep a "tree-saucer" full of it in their yard. If this matter has been neglected, and soft, shell-less eggs have resulted, the quickest way of getting matters right again is to add a little lime to the drinking water.

DUST BATHS. Fresh earth is one of the greatest of all natural aids in healing stings, venomous bites and cuts, and is known to have a wonderfully purifying effect, and often dispels, absorbs or allays decaying vegetable matter and the formation and emanation of noxious gases which cause sickness and disease.

Fresh earth in the hennery and dust box is indispensable for fowls. It will cleanse their feathers and skin from vermin and impurities, promote the skin secretions and is materially instrumental in preserving their health. During the fine days of autumn there is no excuse for neglecting to store up a heap of fresh loam for the floor and under the perches to prevent liberation of the ammonia from the droppings, and road dust for the boxes with which to renew them at regular and short intervals when they become unclean and effete.

In winter, when fowls are confined, a good dust bath before the rays of the sun is as enjoyable and beneficial to them as is a weather bath to the genus homo. A quantity of sulphur or carbolic powder thoroughly incorporated with the dry dust will make it more effective in dislodging vermin.

MATING AND BREEDING. With the fancier this is one of the most difficult, and at the same time most interesting, operations in poultry culture. In mating fowls man seeks to guide and control nature's laws to the elevation of the standard of the breed or to its maintenance. The first requisite in mating fowls for any purpose is to secure birds possessing strength, vigor and stamina. Select stock noted for these characteristics and you can rely upon strong, hardy chicks. Not only should the birds be strong and hardy at the time of maturity, but they should have always been so. In breeding for utility the four main points to be desired are hardiness, early maturity, productiveness and table quality. These are of importance in the order named. Breeders disagree as to the age for breeding birds, but it will generally be found that cockerels nearly or quite a year old, mated to two-year old hens, give the best results. A cock two years of age mated to early pullets will also be found satisfactory. The age of the males and females should vary, and for this reason cockerels and pullets should seldom be mated together. If the cock and hen have been entirely separated during the several months preceding the mating, so much the better, as the added amount of vigor is very beneficial. In breeding for "fancy points" one should understand exactly the object sought, and have a clear idea of the means employed in obtaining that object. If there is a defect in cock or hen it should be counterbalanced by perfection on that particular point in the other. For instance, should the cock's comb be defective in any way, as lop-combed, the hen's comb should stand perfectly erect, and be fine in other respects, in order to breed out the defect arising from the comb of the cock. No over-fattened birds should be used in the breeding-pen, as non-fertile eggs will abound there if they are.

The respective influence of the cock and the hen has been a fruitful topic of discussion. It has been held by many writers that the cock possesses greater influence over external, and the hen over the interior and living qualities.

In most forms of animal life the proportion of sexes is about even, but in the feathered tribe, when the cock necessarily requires several hens, much culling must be done, and it is certain to be accomplished. No sooner do the cockerels arrive at a suitable age for mating than the question as to who shall be lord of the harem arises. Frequently the battles to determine this question are long and bloody, extending over a period of several days; the result, however, being certain from the beginning. The one possessed of the most vigor and the greatest amount of staying power will win, while the weaker and inferior specimens will either be killed or driven into obscurity. The number of hens allowed with one cock should vary with the object in view. An error is often committed by assigning too many hens to one cock. Not more than five hens should be allowed to associate with one cock when the quality of the breed is a matter of interest. If profit is sought for in the production of eggs alone, one cock, if a stout, young and lively bird, may have as many as 24 hens.

In perfect mating, the sire should possess beautiful plumage, perfectly marked, fine symmetry, and as large size as is compatible with full vigor. The dam should excel in productiveness and size, while the shape and plumage must not be lost sight of.

INCUBATION OR SITTING. In the selection of eggs for hatching, great care must be taken to procure fresh and fertilized eggs. They should be laid by hens which have been running with a cock of the proper breed, and for this purpose the cock should not be allowed more than six or eight hens. In short, every condition should be observed to produce healthy and strong stock. Eggs intended for hatching should be dotted with a lead pencil, and those of the same age as nearly as possible selected for a brood. Eggs that have been laid a month or more are altogether too old to be relied upon, although they sometimes do fairly well at four, five, or six weeks old. Until the eggs selected are put under a hen, keep them in bran, with the larger end down, and never jar them. It is impossible to tell beforehand what sex the eggs are, but the latest theory is that those which are the most wrinkled at the smaller end will produce males.

The hen manifests the desire of incubation in a manner different from that of any other known bird. Nature having been sufficiently tasked in one direction, she becomes feverish and loses flesh; her comb is livid; her eyes are dull; she bristles her feathers to intimidate an imaginary enemy; and as if her chickens were already around her utters the maternal "cluck." At this period first, by a two or three days' trial with an egg or two, see whether the sitting fever is coming upon her in real earnest before you put the eggs under her, lest she sit upon them for a day or two, and abandon them, thus spoiling eggs that may have cost you a considerable sum. Set the hen out of reach of danger but near to the other fowls of the yard, and place under her 13 to 15 eggs, according to her size. Make her nest as hereafter described, or in a box open on one side, at one end of a run-way. An empty flour barrel with the mouth a little lower than the bottom, so the water of rains will not run in, is a cheap and good thing. The run-way should not be more than four or five feet by eight or ten, enclosed by a lath fence two and a half or three feet high. Of course this should be on clean ground, but in a moist place; and her premises should be kept clean. The run-way may be on grass or gravel. When her nest is made in a box or barrel, it is strongly urged that four or five inches of moist earth should be the bedding upon which the straw is laid; and during the whole period of incubation the eggs should be kept moist, either by the rising vapors of the earth underneath, or by daily sprinkling them with warm water. In lieu of this trouble, some take the eggs two or three days before they are hatched and soak them half an hour in warm water, so as to soften the shell for the little ones to pick their way more easily out.

About the eighth evening of sitting, examine the eggs by holding them between your eyes and a lighted candle, and take away all those that still look clear, for they are either not fertilized or are otherwise good for nothing.

The hen should be fed regularly and carefully; and if she sometimes remains off her nest for hours, do not be alarmed, as a cooling of the eggs occasionally will not hurt them in the least. Treat lousy sitting hens with sulphur or pyrethrum, not kerosene. When the chicks are hatched unevenly as to time, it is a misfortune. Take the first hatched away from the nest and wait a few hours, and when a majority are out of the shell, destroy the rest, for they would be only weaklings any way.

Cochins and Brahmas make the best mothers, and the former are good for early eggs and chicks. These early chicks, if well taken care of, will be good for producing eggs the following winter.

The chicks should not be handled more than need be. If it is necessary to help them from the shell, do so very carefully. Do not remove them from the nest until 24 hours old. They need no food during this time, as they are digesting the yolk from which they were hatched. Have their coop in a place well protected from the wind, and where they will get the benefit of the sun. When taken from the nest, give the hen water, and all the corn she will eat. Feed the chicks hard-boiled eggs chopped fine for at least a week. After they are a week old, a little cracked corn and wheat screenings may be fed in connection with the egg. Young chicks should be fed five times a day until ten weeks old. Green food (onion tops chopped fine or lettuce) is excellent for chicks. Never allow chicks to perch until three or four months old. Let them sit on straw on the floor, or a board ten inches wide about a foot from the floor, thus avoiding crooked breast bones. Do not house them with old fowls, as they peck and worry them, and never, under any circumstances, feed very young fowls with the old birds.

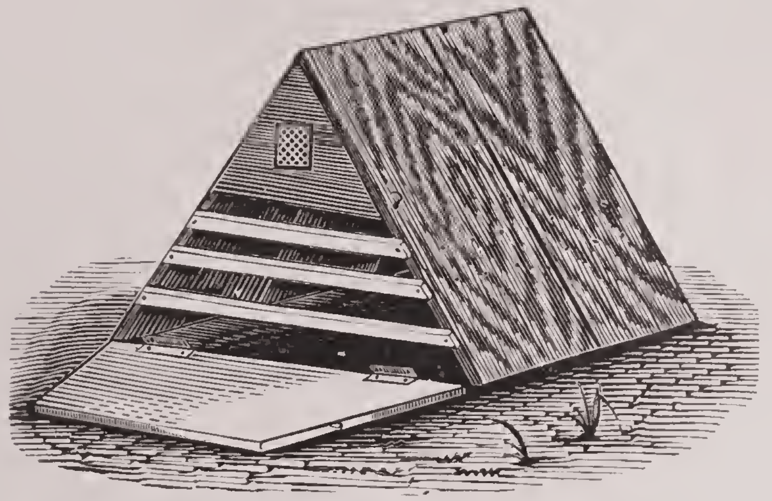


FIG. 17.—*Coop for Hen with Chicks.*

For their home a cheap and good method is to get a large box, such as merchants pack goods in for transportation. Knock one board off the end and place on the top a sash of glass, such as gardeners use to cover over hot-beds; one end will be higher than the other; place the lowest end to the south, so that the sun may fall directly in the box through the glass, beneath which will be placed your chicks. Next cut a small opening at the side or end and place a small box, minus the end, close against the hole. This is for the mother hen to cover her chicks in during the night. Or place the small box inside the large one in one corner, which can be taken out every day and cleaned; though if placed outside as first mentioned, it can be easier cleaned, and it will be more likely to be done. By Figs. 17 and 18 we illustrate two different coops, and, although common and easily made, for all practical purposes doubtless surpass all others.

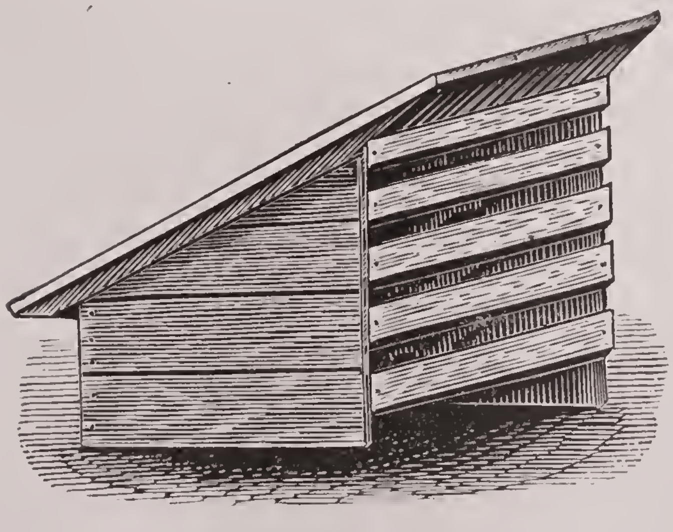


FIG. 18.—*Coop for Hen with Chicks.*

As a general thing, young chicks are quite strong and healthy when the hen first comes off the nest with them, and if left entirely to themselves (that is, to seek their own living), they will thrive and grow much faster and be stronger and healthier than when artificial means steps in and deprives them of their natural instincts by confining them in too small a space and by giving improper food. Plenty of range and exercise are the first requisites to health and strength. When hens are determined to sit at seasons of the year in which there is little chance of bringing up chickens, the eggs of ducks or geese may be furnished her. The young of these may be reared without much difficulty at almost any time of the year. Where, however, it is inconvenient to gratify the desire, one or two doses of jalap will often entirely remove the fever, or shut her up in close confinement with a cockerel for a few days, or in a coop to herself, but in sight of the other fowls, and have pegs about four inches apart all over the ground under her, so that she cannot sit down. At night let her roost with the other fowls.

The period of incubation is three weeks, although chicks are often hatched in 18 days. Should the hen fail to sit closely, during the first few days, or in early spring, it will occasionally be a few hours longer. During the hot months and when the hen is assiduous the time will be a few hours less. Chickens have been known to come out as late as the 27th day.

FEEDING CHICKS. In the early stages of chickenhood hard-boiled eggs seem to be the most natural food for the first week or so, until they become gradually weaned to take to bread crumbs dry or soaked in milk. But although wholesome and nourishing in every way it is not at all indispensable. A cheaper food, alternating with the first week's feeding of eggs and bread crumbs, will answer very well; some breeders make a staple diet of equal parts of coarse corn meal and wheat bran, mixed with milk. But for the first few weeks it is better to have it cooked or baked and fed to them in a crumbly state. When the chicks have passed the first stage, cooked meal, meat, scraps from the table, boiled potatoes and chopped cabbage, fed warm two or three times a day, will help them to grow. This variety is more essential in early spring when there is no green or insect food. In cold, wet weather a dash of pepper may be used in the morning meal with good advantage. Good results have come from feeding a thick mush of oatmeal, cracked wheat and bits of meat during the first month with those already mentioned. Chicks should be fed liberally and often, yet only what is readily picked up clean. Fix a place where they can have ready access to, and where they can get, their food without being troubled by the hens. A box with laths covered on the top and space between the sides for the chicks to run in and out will do. Give them their feed inside this box and they will soon learn to go there when they are in need of something to eat.

INCUBATORS, apparatus for the artificial hatching of eggs. The process has been in vogue in Egypt for many centuries, with success, but in Europe and America the climate is so changeable that it is difficult to compete with Egypt in this line. With the most modern apparatus a skilled hand can succeed tolerably well, but to use it requires constant attention. Absolutely fresh eggs must be selected, the temperature must be kept strictly at 103°, with an allowance of an occasional variation of two or three degrees from this, and moisture must also be very carefully supplied. Artificial hatching, therefore, should never be resorted to except in case of great necessity, and then by the best modern apparatus and under the supervision of a skillful hand. It is claimed that chicks hatched by an incubator excel in growth and development.

ARTIFICIAL REARING. An artificial "mother" may be made of a board about a foot square, elevated above the ground about four inches on one side and only two on the other, on stakes. The lower side should be lined with clean wool; generally a lambskin tacked on is the most practicable. The front side should be curtained, the lower edges of the curtain just touching the ground, so the chicks can go in and out at leisure. In short, the whole apparatus should be a substitute for the real hen as nearly as practicable. A few small gimlet holes should be bored through the board, for ventilation. The floor, ordinarily, should be the ground; but sometimes in stormy weather it is a great convenience to have a floor, for the sudden removal of the brood to a place of safety. This contrivance should be set on a clean, new place, near by, every day. In front should be a "run," as described on a preceding page. Part of it should be covered with wire gauze, to protect the young fowls from seizure by larger animals. The feathers are liable to be infested with vermin, and should occasionally be well dusted with sulphur or pyrethrum and smeared in places with a little paraffine. The artificial rearing of chickens in winter is too arduous to be remunerative except in case of very rare breeds. When a chick does not at first take food, tap on the floor where the food is, at the same time clucking like a hen; this method will usually succeed. Nearly all rules and regulations for the successful rearing of fowls are summed up in the three words, *warmth*, *cleanliness* and *regular feeding*.

POULTRY HOUSE. Every farmer should have a good, convenient poultry house, properly constructed, sufficiently large to contain the number of birds he desires. It should be warm and dry in the winter, well ventilated and kept scrupulously clean. The house should not be over-crowded, but just large enough. Nothing is made by over-crowding the hennery; on the contrary it will prove detrimental. The fowls must be fed regularly and at stated periods. They must have plenty of pure water at all times; this is of as much importance to the health of the brood as proper food. If possible, they should also be given, in addition, a plat of grass for a run.

A poultry house need not necessarily be expensive, but should be arranged with special reference to convenience in caring for the comfort and health of the fowls. In all the planning of the house and its furnishings, have an eye constantly on the conveniences of cleaning whenever filth accumulates; for whatever is inconvenient to be done is sure to be neglected. By having plastered walls and perfect connections at all joints, the house can be made vermin-proof.

In selecting a site for your poultry house and yard, choose a dry location with a southern or eastern exposure, if possible, higher than the surrounding ground, that the water may run off rapidly. A damp location will never do. The soil should be of a porous nature, either sand or gravel predominating. A level clay surface is worse than nothing. If the right location can be had at the south side of some building that will give it protection from cold winds, so much the better. Be the site where it may, be sure that the floor of your house is higher than the ground outside. Do not make the mistake frequently seen of digging down a foot or so in order to make it warmer. Better by far bank it up when the weather requires it. The floor of your house may be dry earth or gravel, or, if economy is not to be studied, concrete is still better. Of whatever material it may be made, the floor should be kept covered with dry earth, renewed weekly, or oftener, as strict cleanliness is absolutely necessary for profit and the well being of the fowls.

A house to accommodate, say 30 fowls—which is about the average usually kept by farmers—should contain at least 150 square feet, or five square feet to each fowl. It has been the experience of every one that has entered into the raising of poultry extensively, that fowls will do much better if in small flocks. Two flocks of twenty-five fowls each will prove more profitable than when allowed to mingle as one. The following plans in this article will be found very convenient, economical and every way desirable. They are susceptible of various modifications to suit location and requirements.

The nest boxes should be twelve or fourteen inches square, and ten or twelve inches deep; they should be open at the top and at one end, except a strip three inches high across the bottom end to keep the eggs from rolling out.

The roosting bars should be horizontal and movable; placed fifteen inches or more from the wall, and ought to be at least four inches in diameter. Large bars add much to the comfort of fowls while at rest, and prevent in a great measure crooked breasts and frozen toes. Under all roosting bars place a movable shelf of sufficient width, and keep it constantly covered with dry earth, muck or plaster. The droppings should be removed every week, at least, and stored under cover outside of the hen-house. Be sure and save them all, as their value often equals a fifth of the whole poultry business. The amount of the accumulation during the year, if properly saved, will astonish you, and in value is nearly equal to the best imported guano. When composted with muck and ashes, and applied to the corn hill at planting time, the increase of the crop will go far towards supplying your fowls with the corn they will require to carry them through the winter.

In a poultry house there may be an upper apartment, which would be admirable for the rearing of chicks, especially those of delicate breeds, as it is dry and airy, the yard affording sufficient run on hot days, when the heat in the closed house is beyond endurance. With very early chickens this is seldom the case. It is well where chickens are thus reared in numbers to accustom them to the outside air by degrees, in order that they may acquire strength and hardiness with their growth. Chicks that are so reared learn to roost under cover, and thus one great difficulty is obviated. It is quite necessary that young fowls are first led to roost in the place where they are to remain, and thus good habits are not broken up. In the upper story is kept a large, shallow box, filled with dry, pulverized earth, intermixed with wood ashes, for the fowls to wallow in. Broken clam and oyster shells and gravel are provided in abundance, as well as green food and fresh water.

Fresh air and cleanliness are of the first importance. The droppings may be received on boards covered with dust and carried out at least once a day, and every August the roosts and nest boxes should be taken out and scalded by pouring boiling water on them; then whitewash the house inside, also the nest boxes and roosts; add an ounce of carbolic acid to a gallon of whitewash. This will rid the house of lice if there be any in it. The dusted board should be so pegged that the fowls will not wallow on it and throw the dust off. The covered run should be raked over two or three times a week, and dug over whenever it shows signs of stagnation. In fact, three or four times a year the soil to the depth of two or three inches should be removed and new put in its place.

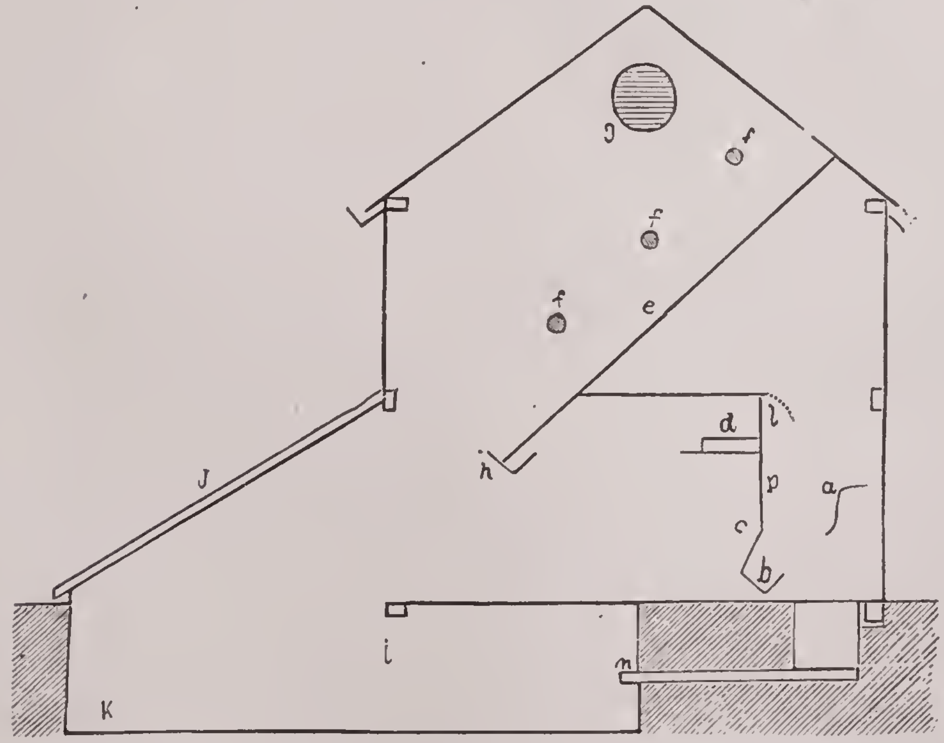


Fig. 19.—*Plan for Fig. 20.*

The "run," or open yard, should be as large as you can spare the ground for. One side should have a shed with roosts, and furnished with a heap of dry dust or sifted ashes for the fowls to wallow in, and should be renewed whenever it becomes damp or filthy from use. A walk in front of the sheds should be graveled, and the rest of the open yard kept in grass, which, if well rooted first, will bear small fowls upon it several hours a day, but should be renewed in the spring by re-sowing, wherever needed. The runs should be enclosed with wire netting, two-inch mesh, which may be conveniently stretched on poles 1½ inches square, driven two feet into the ground and set five feet apart. The height of the fence depends upon the breed to be protected. Cochins and Brahmas are easily retained by a netting a yard high; for moderate-sized fowls six feet high will do; while Game, Hamburgs and Bantams require a fence eight or nine feet high. There should be no rail along the top, as that would be a temptation to the fowls to fly over, as they would see a rest there.

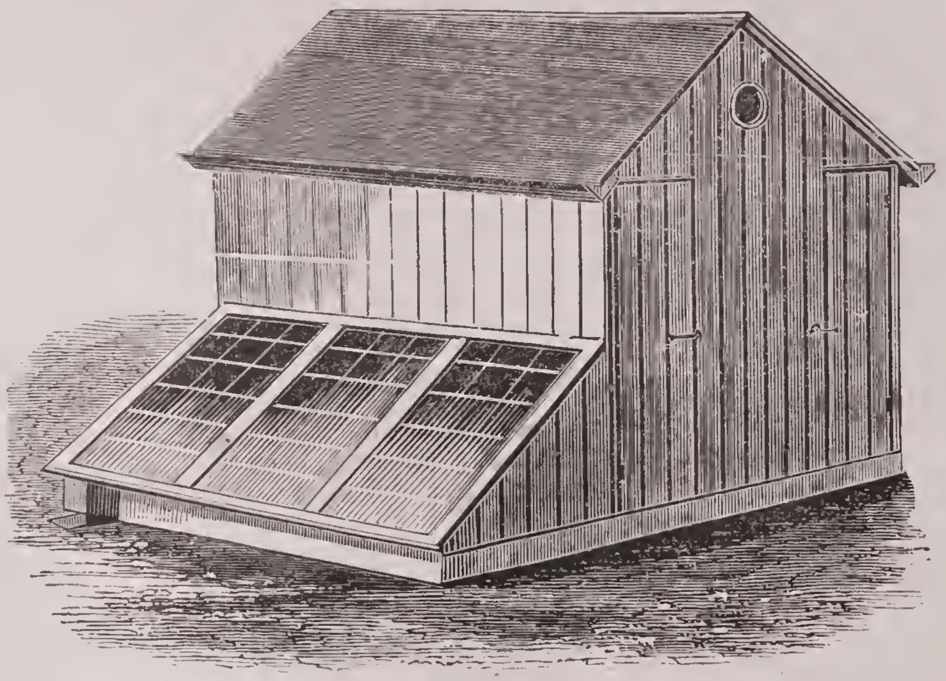


Fig. 20.—*Poultry House.*

We present two excellent designs for poultry houses, both combining all the modern conveniences, one, however, less pretentious in its proportions and finish than the other, but both susceptible to various modifications.

By Fig. 19 we illustrate the design of a cheap but convenient house. It can be made of cheap material and will cost not more than $25. Fig. 20 shows view of south side and east end, showing glass covering to pit and outlet to yard; also two doors in the end of house, one opening into feeding hall, and the other in front of roosts.

Fig. 19. A cross section, showing feeding hall (a), two feet wide, whole length of the house; feeding trough (b) with narrow slats (c) from inside edge to bottom of partition (p), slats two and one-half inches

apart, one foot long. Nest boxes (d) one foot four inches deep, on shelf 18 wide; with doors into feeding hall at (l); roosts (f) with slanting door (e) to be scraped into trough (h) and carried out through door in end of house; ventilator (g); pit (i) two feet deep, extending half way under house and five feet in front, with glass roof (j) of common hot-bed sash three by six feet; bottom covered with dry sand. Gravel box (k); water (n), four feet long, one foot wide, three inches deep, extending into pit three inches, filled through trap-door in feeding hall.

The water trough is placed about midway of the building and below ground to prevent freezing.

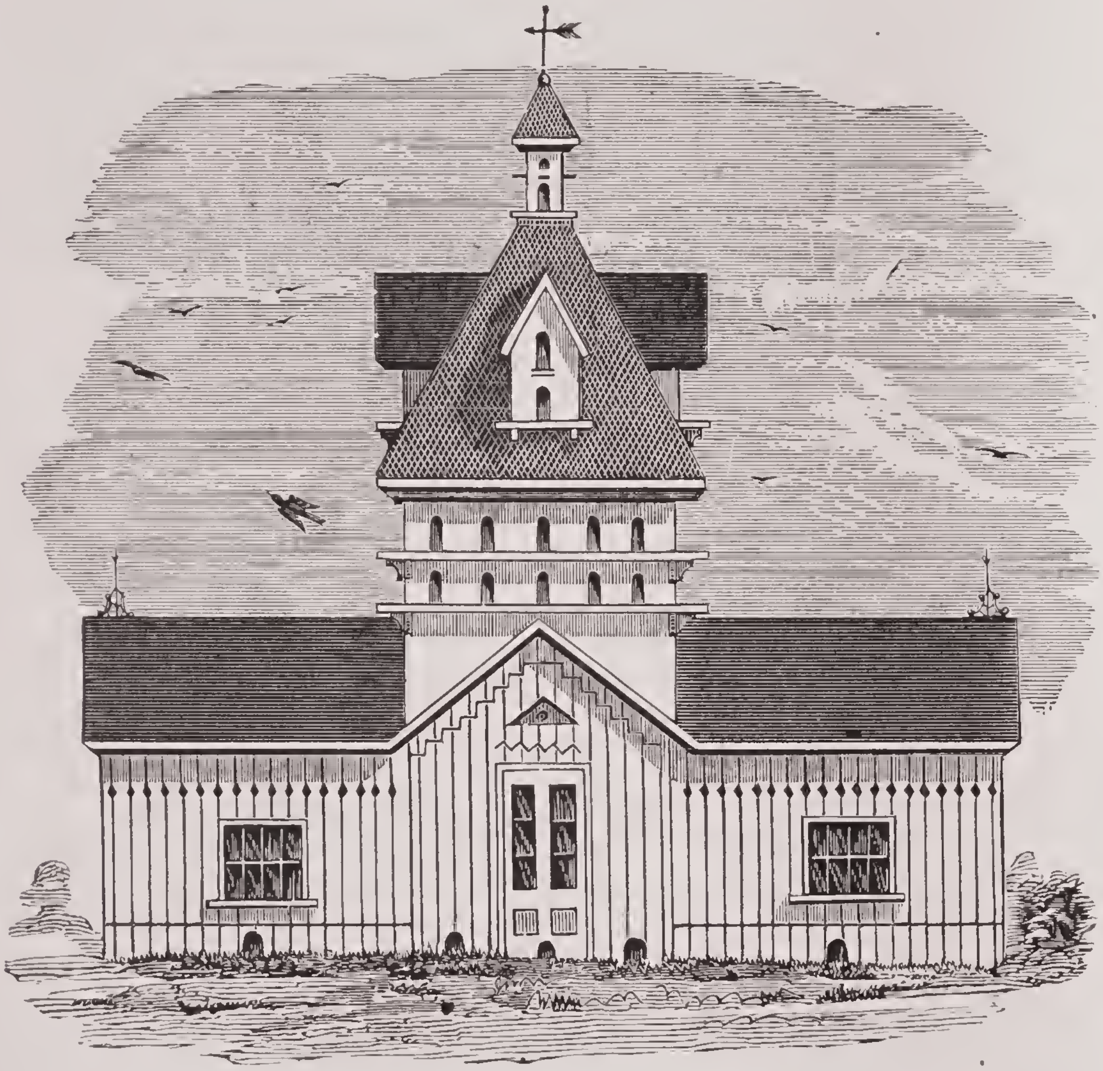


Fig. 21.—*Poultry and Pigeon House.*

The house shown is eight feet wide, nine feet long and six feet high to eaves. Sides of one-inch boards, battened. Roof, floor and slanting floor to roosts, of matched flooring. Walls or pit of brick or boards, cement or asphalt bottom; or in dry soil no floor needed.

The house can be made longer and divided by cross partitions, all being fed, watered, etc., from the same hall. The yards are not shown, but may be added to suit the convenience of the proprietor.

Poultry and Pigeon House, represented above, consists of a center room 8 x 14 feet with two wings of 10 x 14 feet, and can be enlarged so as to make it any desired size, and with good light and ventilation. The entire building may be under the control of the attendant, the fowls fed, watered, and eggs gathered from the hall D (Fig. 23) without disturbing the fowls. The entire house, including the pigeon loft, may be heated from the center room if desired. The partitions are of lattice work made of netting, allowing free ventilation and an unobstructed view of the fowls.

The nests I are 28 in number, and are 16 x 20 inches in size. They are so arranged that hens may enter them from the runs. When you wish to collect eggs from the nests, you draw out the drawer, and when you have collected the eggs, you push it back to its place. When hens wish to sit, you draw out the drawer and leave it in the hall D as represented on ground plan, where they can feed and water at pleasure, and prevent other hens from laying in their nests, in case you are short of nests. Then, when your hen goes to sit, take the drawer and hen and place her in the center room and replace the additional drawer. The roosts C are made of 1 x 6 boards and two feet from the floor, and a sufficient distance from the wall so as to protect the plumage. The yards B may be used for young chicks. The yards A can be enlarged if the grounds will admit. The second floor is intended for pigeons, and can be reached by a step-ladder, which may be dispensed with at pleasure.

The building is made of one-inch boards, sheeted up and down with batten joints, and lined on the inside with heavy tarred paper to prevent all draught and cold in winter, and prevent vermin, in summer, from collecting. The entire building should have a smooth floor and kept well covered with dry earth or sand.

Diseases. Fowls properly taken care of will scarcely ever be sick, and when one does become afflicted it is often best to kill it immediately, to avoid further infection of the flock, as well as many other troubles. Only in the case of valuable birds do we recommend much attempt at cure, and then only when success is pretty certain. In the treatment of fowls one disease must not be mistaken for another. For instance, the name of "chicken cholera" is quite frequently applied to many ailments that are simple, or merely disarrangements of the internal organs that may be easily remedied by a change of diet or place.

It is easy to tell when fowls are ill. The comb of each fowl is a true index to the workings of their systems. If they be in ill-health the comb will lose color, and will become far less firm in texture as the malady increases, the comb being of a livid dull crimson, or else pale or ashy in appearance. Look at the comb of a laying hen or pullet. She is in the height of health and strength, and carries her unfailing sign of healthfulness on her head in the shape of a blood-red, bright and full comb. A vigorous cockerel will carry the same sign, though not, perhaps, in so eminent a degree as his harem.

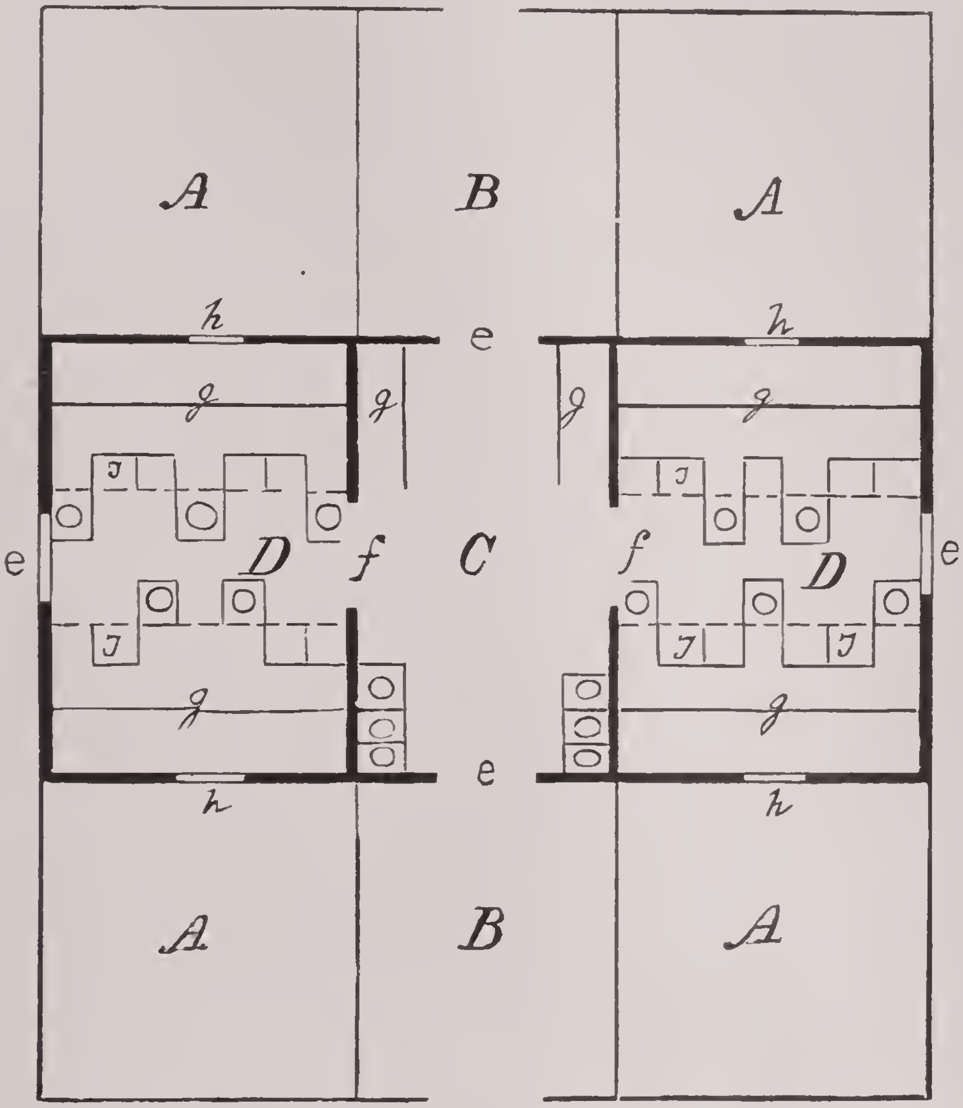


Fig. 22.—*Plan for Fig. 21.*

A. Outside yards or runs. B. Outside yards or runs for young chicks. C. Center room for feeding, etc. D. Halls or passage ways for sitting hens. *e.* Outside doors or windows as preferred. *f.* Lattice door. *g.* Roosts. *h.* Windows. *i.* Nests. Partitions are all lattice.

If the cholera or any disease should come into the flock, carefully examine the comb of each bird, morning and night, and all those which are wanting in that bright, rich color which denotes perfect health, remove at once from the flock to a place remote, where they should be at once put under medical treatment.

Apoplexy occurs from over-feeding, and can seldom be treated in time to be of service. Bleed the bird from a vein visible on the lower side of the wing near the body and apply cold water to the head. This may recover the case.

Bad Fledging of chicks may be remedied by a diet of meat, and bread sopped in ale.

Bad Moulting. Give stimulating food, warm, every morning, and well peppered, with meat and ale every day, and keep under cover in wet weather. Give also the Douglas mixture (see page 531), and some hemp-seed with the grain every evening.

Bumble Foot. A bruised and pus-puffed condition of the foot, resulting in lameness. Caused by heavy fowls jumping and flying from roosts upon gravel, stones, etc. Treatment: If discovered before the pus congeals, lance the swelling at the front and rear of the foot, press out the pus and inject a solution of carbolic acid and water. When the pus has congealed, use a strong liniment and let the inflammation settle down into a corner.

Chicken Cholera. The first symptoms in the cholera are a drooping of the wings, a sticky slime in the mouth and throat. The fated chicken loses its strength and refuses to eat; the wings droop, the feathers rise until the bird resembles a ball, and the feet grow feeble and tottering. An uncontrollable sleepiness comes over it, and it appears as if narcotized; no sound escapes it, and still drowsy it dies in mute agony. The poisonous excreta has corroded the rump, and the flesh of the bird is one mass of raw sore. There are a host of minor symptoms, not always noticeable to the superficial observer. Among these are a high rise of temperature, and a condition of intense fever; an assumption of a violet color by the comb, in consequence of a perturbed condition of the circulation; rapid progress of the disease; contagiousness shown by spreading of the disease; and more important than all, the apparently highly painful death. In some instances the diseased fowl dies in less than one hour after the attack. Dissolve in one gallon of the drinking water half a teaspoonful of

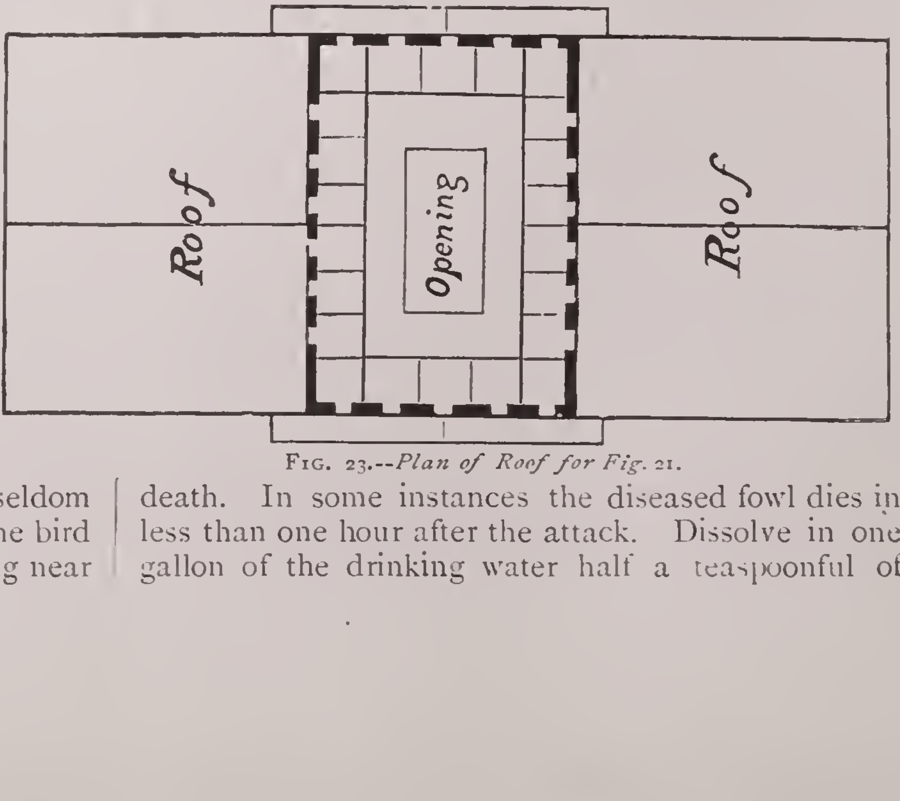


Fig. 23.—*Plan of Roof for Fig. 21.*

alum and the same of copperas; at the same time give daily in the soft feed a little sharp sand at the rate of one teaspoonful to a fowl. In severe cases give at once by hand a piece of alum and a piece of copperas, each the size of a pea, mixed in a dough, with one teaspoonful of sand and a little meal and water. Continue the medicated water and sanded feed till all signs of disease disappear. As a preventive, make a paste, as follows: Cayenne pepper one part, prepared chalk one part, pulverized gentian two parts, charcoal two parts, by measurement, mixed with lard. If the disease is in your vicinity, give, once a week, all your fowls an ordinary-sized pill. If a chicken is taken with cholera it should be at once killed, and the rest of the flock taken from the yard where the case occurred. Strict watch should be kept over the flock, lest others become attacked. Meantime the yard should be thorougly cleansed; the manure should be removed, and the roosts, etc., washed in a six-drachm solution of sulphuric acid. After ten days, if no further cases have occurred, the birds may be returned to the yard. This is the only treatment admissible, but it is effectual.

Chicken Pox. An extremely contagious, watery eruption of the comb, face and wattles. Symptoms: Yellowish-white rash, appearing as above, bleeding profusely when the crests are removed. It takes from five to seven days to run its course. Treatment: Remove the crests and bathe in hot water and carbolic acid. When the bleeding ceases, apply citrine ointment; take off the scales after sixty or seventy-two hours. Each morning give a pill made as follows: Tablespoonful each of common flour and flour of sulphur, teaspoonful cayenne pepper, sixty grains hyposulphite of soda, and milk enough to mould into twenty pills. Dissolve four grains quinine in two-thirds of a pint of milk, and give in three equal doses during the day. Feed boiled onions and rice mixed with oat-meal.

Diarrhea, a morbidly frequent evacuation of the intestines, the scourge of young chicks in early spring. It is caused by improper food and lack of corn. Give chicks nothing but scalded milk for drink, and none but cooked food. For older fowls, a tablespoonful of castor oil, and ten drops of laudanum are effectual. Feed bread soaked in scorched milk and black pepper, and supply plenty of burned bones and charcoal.

Diphtheria or Canker. Take tincture of aconite, six drops; bichromate of potassa the size of a large pea; the same amount of iodide of mercury; put into six drops of water. Put six drops of this mixture into one quart of water and stir into it meal and feed.

Diseased Feet. We frequently see fowls which are troubled more or less with their feet, especially after arriving at maturity. The feet and legs of birds are extremely sensitive, and this is manifested in many ways. Sometimes a bird wrenches a nail from the toe. This is often the case with turkeys in cold weather when the ground is frozen. The blood flows profusely, and a slight lameness is occasioned. Indeed, if it be a middle toe, the fowl will always limp more or less. Turkeys usually seek a high roosting place in the fall of the year, and alighting therefrom when the ground is frozen they injure the feet. Common fowls in alighting strike more on the soles or heels. Hence come so many "bumble feet" among the barnyard fowls, which, if it does not effect or injure the fowl to any great extent, is unsightly. When fowls are confined in filthy places and obliged to tread over ground covered with their own droppings, more or less disease of the feet is occasioned from the dirt remaining in the wrinkles on the toes. They need a run over the grass at least once a day to clean the feet. Fowls do not want wet or damp standing or walking places. The moisture soaks the feet and makes them tender. Where fowls run daily on sand or gravel there will often be found bunches on the feet or toes. Sometimes the gravel or dirt works under the skin and forms a hard lump that increases in size until suppuration sets in, and the fowl gets relief by opening it. Sometimes the lump cannot be removed. Either of these cases is unsightly, and hurts the looks of the bird. During the moulting season the legs undergo the same process of change, and a new skin grows, which, if the legs be without scurf, will appear bright and fresh like a chick's. There is nothing more unsightly than scurfy legs. This is in part hereditary, and in part brought on by filth. None but white and yellow-legged birds are affected with it to any extent. Although scurfy legs may be cured by the use of carbolic soap and an ointment prepared of lard and sulphur, it is better, if possible, to avoid the trouble by breeding and careful cleanliness. To shun bumble-footedness and bunchy toes, or lumps on the web, train the birds to low roosting poles, and keep their walks comparatively clean.

Distemper, an affection of the head and throat of young fowls; a cold; incipient roup. Symptoms: Fowl listless and quiet, remaining on the roost in the day-time; face and comb quite red, and puffy under the eyes; no appetite. A white froth appears in the corner of the eye the second day. Treatment: Wash the head and beak clean, and clear the tear tube by blowing down through the nose into the throat; then bathe the head and wash the throat with a solution of carbolic acid—one part of acid to ten of water. Keep quiet and allow nothing but water for a day or so. In aggravated cases, steam the head and throat, give a dessert-spoonful of castor oil, and repeat the carbolic acid treatment at short intervals.

Soft Eggs are generally caused by over-feeding, the lack of limy food, or fright.

Dropping Good Eggs on the ground away from the nest is probably due to filth or vermin in the nest.

Egg-Eating. Some hens will eat eggs most persistently. Have their nests small and in a remote, dark place, feed soft food and cut off the tip of the beak, just touching the "quick."

Feather-Eating. Change the diet and give them larger liberty. If this does not succeed, cut off the tip of the beak, as for egg-eating.

Gapes are thought by some to be infectious. At least they are epidemic. The disease is usually the result of drinking foul water, exposure to wet or want of nourishing food. It consists of small worms which infest the windpipe and cause the chicken to gasp for breath. To cure gapes put camphor in the drinking water, and give the chicken a piece of camphor about the size of a grain of wheat, every day, or a very small quantity of turpentine may be given daily in meal. Of course the chicken must be well taken care of, and if it has been neglected in the least, the neglect must not continue. If the case has been allowed to progress until it has become fully developed, the worms must be removed, which is done by introducing a loop of horse hair into the trachea, and turning it around while introducing it. This operation should be continued until all the worms are extracted. Sometimes a feather stripped almost to the top may be used instead of the horse hair.

Leg Weakness is due to too rapid growth of the body. Give a greater proportion of meat, and daily three or four grains of ammonium citrate dissolved in water. If the weather is warm, the legs may be dipped daily for a few minutes in cold water.

Loss of Feathers is almost always caused by want of green food or of a dust bath. Anoint with sulphur and creosote; but you will have to wait until after the next moulting for good feathers.

Pip is a foul, thickened tongue, indicating bad digestion, roup or some other evil.

Roup, a kind of contagious influenza, the chief symptoms of which are lassitude and an offensive discharge from the nostrils and eyes. It is more to be dreaded than all other diseases, and is generally induced by damp drafts, and confinement in filthy, badly ventilated coops or small yards. Musty, moldy, and poor food, together with impure and stagnant water to drink, are also among the causes. As it is a contagious disease, such as are apparently healthy should be removed to a distant and clean place, and be prevented from again having access to their usual habitation. When the disease is far advanced, treatment is out of the question. Such animals should be destroyed and immediately buried deeply in some secluded place. When taken in hand in the beginning of the disease, dry and comfortable lodging and stimulating, nutritious food, are the first essentials to recovery. The eyes and head should be frequently bathed with warm water, and remedial agents applied to the diseased membrane. This is somewhat difficult on account of the nostrils being closed up, but may be overcome by inserting the point of a small syringe into the slit in the roof of the mouth and turning it rather to the outside for each nostril. A small portion of a solution of 10 grains of sulphate of copper to each ounce of water, may thus be brought into the nasal cavity. As an internal remedy, may be used half a teaspoonful of castor oil; thereafter, give every morning and evening a pill of the following composition: Take 1 ounce of balsam copaiba, ½ ounce of powdered liquorice, 1 drachm of piperine, and enough of magnesia to make a mass which will divide into 60 pills. Fresh drinking water should be provided twice daily, in previously cleaned vessels, and to the water may be added a few drops of tincture of iron. Good, clean and well ventilated quarters, free from drafts, ample range of liberty, good nutritious food, ashes and sand to roll in, a little tincture of iron occasionally added to their drinking water, and a little flour of sulphur added to soft food, once or twice a week, will be found of great benefit, and go far towards preventing the appearance of this scourge of poultry.

LICE. The whole feathered tribe seem to be peculiarly liable to beinfested with lice; and there have been instances when fowls have been so covered in this loathsome manner that the natural color of the feathers has been undistinguishable. The presence of vermin is not only annoying to poultry, but materially interferes with their growth and prevents their fattening. They are, indeed, the greatest drawback to the success and pleasure of the poultry fancier; and nothing but unremitting vigilance will exterminate them, and keep them exterminated. Therefore, whitewash frequently all the parts adjacent to the roosting-pole, take the poles down and run them slowly through a fire made of wood shavings, dry weeds, or other light, waste combustibles. Flour of sulphur, placed in a vessel and set on fire in a close poultry-house, will penetrate every crevice and effectually exterminate the vermin. When a hen comes off with her brood, the old nest should be taken out and a new one placed; and dry tobacco-leaves, rubbed to a powder between the hands, and mixed with the hay of the nest, will add much to the health of the poultry.

Flour of sulphur may also be mixed with Indian meal and water, and fed in the proportion of one pound of sulphur to two dozen fowls, in two parcels, two days apart. Almost any kind of grease, or unctuous matter, is also certain death to the vermin of domestic poultry. In the case of very young chickens it should be used only on a warm, sunny day, when they should be put into a coop with their mother, the coop darkened for an hour or two, and every thing made quiet, that they may secure a good rest and nap after the fatigue of greasing them. They should be handled with geat care and greased thoroughly; the hen, also. After resting, they may be permitted to come out and bask in the sun, and in a few days they will look sprightly enough.

Carbolic acid and kerosene are the two most effectual antidotes to all sorts of vermin. The acid should be one to two per cent. in strength, and sprinkled occasionally on all the wood-work around the roosts with a brush or broom. The kerosene is to be rubbed on those parts of the fowls which are most liable to be attacked with lice; but sitting hens should not be treated with it, as it would be likely to get on the eggs and ruin them.

To guard against vermin, however, it should not be forgotten that *cleanliness* is of vital importance; and there must always be plenty of slacked lime, dry ashes and sand, easy of access to the fowls, in which they can roll and dust themselves.

We wish to speak in particular of two varieties of lice that infest fowls, and of which we give very fine and accurate illustrations.

Gutscher's Cholera Louse. We give by Fig. 25 an enlarged view of a parasite, almost microscopic, that infests fowls. This is so small that many would deny that there were any lice on their fowls or in their houses, when in fact there might be millions, both on the fowls and in the houses. The engraving shows the louse magnified 1,200 diameters, or 1,440,000 times larger than it really is. It is so small that it takes good eyes to see it unless it is in motion. It is the opinion of some eminent scientists that it is not, as Mr. Gutscher says, the cause of cholera in fowls. These parasites are easily got rid of by the application of Persian Insect Powder and coal oil.

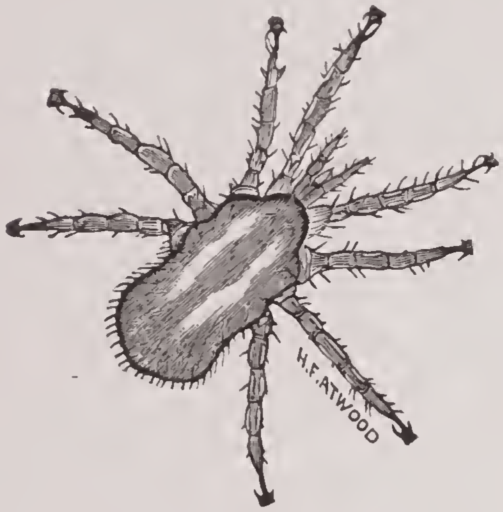


Fig. 25.-*Gutscher's Cholera Louse.*

Probably no subject is of more interest to the student of natural history than that of the parasites. They are omnipresent, in some form or another; we find them on every hand. Man harbors a great number of them, as the tape-worm and the thread-worm. The little black spots on the face indicate the presence of a parasite that lives in the sebaceous follicles of the skin. The disgusting disease known as "the itch" is caused by an acarus closely allied to this louse. This parasite is one of a few which infest poultry. You will notice that it has four pairs of legs; this distinguishes it from the insects and gives it a closer relation to the spider family. In common parlance it is a "mite." In size the body is about one-fiftieth of one inch in length. As seen on the fowl it appears as a minute speck; and were it not for its moving it would escape the keenest eye. It has no brains or eyes, though it does possess a nervous system. At the end of each leg is a sucker with two minute hooks attached to it. This enables the mite to walk on a smooth surface and to cling with great tenacity. In front between the *palpi* you will notice a minute sharp organ. This is at once a lancet and a sucker and comprises his armament of torture. They are extremely prolific and multiply with great rapidity, in some species the female laying fertile eggs without the interposition of the males; this parthenogenesis, according to Parker, having been noticed in several species. They are very tenacious of life. The one from which the drawing was made showed signs of life after having been submerged for over an hour in camphor water.

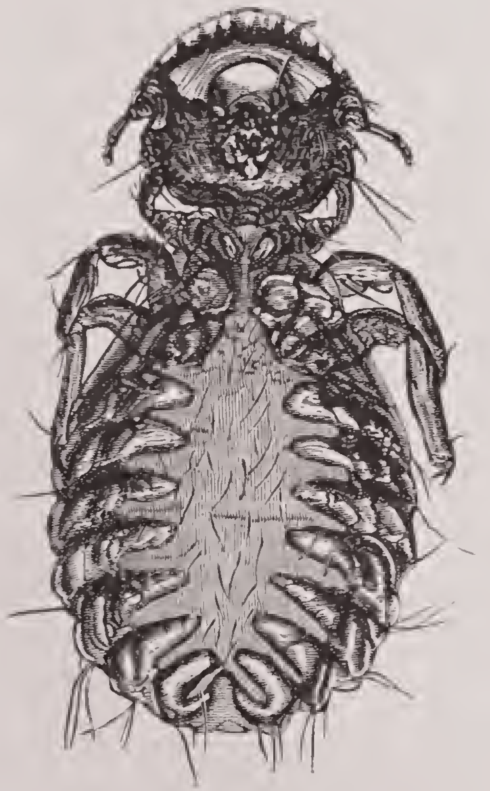


Fig. 26.-*Female Louse.*

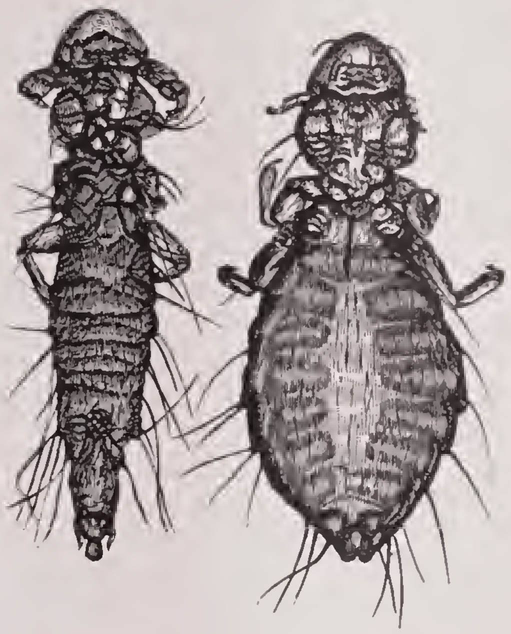


Fig. 27.—*Male and Female Chicken Lice.*

As these are most generally found in cholera-infected fowls, the question has been mooted as to whether they have anything to do with the case of the disease. Prof. Atwood thinks not, but thinks their presence a concomitant rather than a cause of the disease. When the fowl is filthy and diseased the parasite flourishes and with no resistance from the languid fowl.

Chicken Louse (*Goniocotes Burnetti*). The following article on the chicken louse was prepared by Prof. H. F. Atwood, and appeared in the *American Poultry Journal*, November, 1878. By all scientists and microscopists it is regarded as a fine article and the cuts as exceptionally accurate.

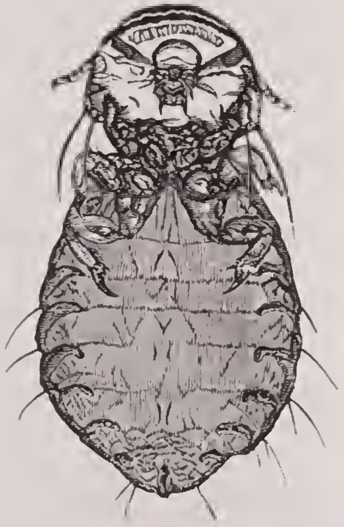


Fig. 28.—*Louse From Light Brahma Fowl.*

"In complying with my promise to give some cuts and a short description of the louse,—the parasite found on poultry,—I am able to present cuts from three different varieties of fowls. Fig. 26 is from a Black Spanish chick. This and the two following, which are from some Light Brahma chicks—were from the heads of chickens and are I believe called by fanciers 'ticks.' Fig. 28 is from a native fowl of the Light Brahma breed. The male and female are both shown in Fig. 27. They belong to what is called the " skin-biting lice," or Mallophaga, and are of this family the most closely allied to the Pediculus, to which family belong the various kinds of human lice. They are called the *Goniocotes Burnetti*, Pack. That they are terribly in earnest about picking up a living, any one who has attempted to dislodge them from the head of a young chick can testify, their entire head sometimes being buried in the tender skin of their victim. Rather than to take the trouble of picking them off when so intent on their work, it is just as effective and far less work to use lard as ointment, and rub it well over the head and neck of the affected chicks. This, while being no inconvenience to the chicks, is a very serious matter to the parasite, as we shall presently see.

" No doubt many fanciers, not well versed on the subject, may wonder why an application of lard should tend to rid their fowls of lice. An elementary lesson in this branch of natural history may not be amiss, and I will endeavor to discribe why so harmless an article should prove so deadly to the louse.

"The system of breathing in an insect is carried on in a peculiar manner; the air enters through little apertures on either side of the abdomen; these are called spiracles, and connected with them are the *tracheæ* or tubes which by their intricate and exhausttive ramifications convey the air to every part of the body where needed. The action of the lard is to close these spiracles of an insect and the result of this is of course fatal.

"By referring to the cuts we see a vast difference in the morphological characteristics of the three specimens. The one from the Black Spanish is much larger and darker than the matronly appearing one from the Light Brahma. It is not fair to suppose that we have here an exemplification of what Darwin terms incipient species? Has not the principle of natural selection tended toward the development, say of the darker color of the specimen from the Black Spanish? Being nearer to the color to the feathers of the fowl on which it lives, it has an advantage in the great struggle of existence. The specimen from the Light Brahma, on the contrary, is of a light color corresponding closely to the prevailing color of this particuar fowl.

"The cuts show the insects magnified a little more than 30 diameters, or, in popular language, they are shown a thousand times larger than they really are."

General Remarks and Practical Suggestions. In preparing fowls for exhibition, it is a common but a reprehensible practice to over-fatten them with a soft, starchy diet, in confinement. Such a condition of the birds misleads ignorant judges at fairs, and renders the fowls of but little value afterward. In preparing for exhibition, it is well to shut up together for a few days beforehand those that are to be shown in one coop, so that they will get used to each other; else, on the journey they will pick and disarrange one another's feathers. Away from their rural haunts, also, they get homesick, which fact must be taken into consideration at the fair.

Fowls do not look well with their wings cut, and their flying power can be fully crippled by simply plucking out the first or flight feathers, which operation is not visible when the wings are closed. Trapdoors between all departments should be supplied, so that the birds can all be kept in one while another is being renewed or repaired.

Eggs should be collected regularly if possible twice every day, and if any chickens are to be reared from the home stock, the owner or attendant should learn to recognize the egg of such particular hen. There is no difficulty in this, even with a considerable number; nearly every egg, to the accustomed eye, has a well-marked individual character; and if there be any hens of value, it may save much disappointment in the character of the brood to know the parentage of those selected for hatching.

Where a considerable number of fowls are killed annually, the feathers also become of value, and should be preserved. They are very easily dressed at home. Strip the plumage from the quills of the larger feathers and mix with the smaller ones, putting the whole loosely in paper bags, which should be hung up in the kitchen or some other warm place for a few days to dry. Then let the bags be baked three or four times, for half an hour each time, in a cool oven, drying for two days between each baking, and the process will be complete. Less trouble than this will do, and is often made to suffice; but the feathers are inferior in crispness to those so treated, and may occasionally become offensive.

In raising poultry or stock it should be the aim of every one to keep it healthy and improve it. You can do it very easily by adopting some systematic rules. These may be summed up in brief, as follows:

Construct your house good and warm, so as to avoid damp floors, and afford a flood of sunlight. Sunshine is better than medicine.

Provide a dusting and scratching place where you can bury wheat and corn, and thus induce the fowls to take needful exercise.

Provide yourself with some good healthy chickens, none to be over three or four years old, giving one cock to every 12 hens.

Give plenty of fresh air at all times of the year, especially in summer.

Give plenty of fresh water daily, and never allow the fowls to go thirsty.

Feed them systematically two or three times a day, and scatter the food so they can't eat too fast or without proper exercise. Do not feed more than they will eat up clean, or they will get tired of that kind of feed.

Give them a variety of both dry and cooked food; a mixture of cooked meal and vegetables is an excellent thing for their morning meal.

Give soft feed in the morning, and the whole grain at night, except a little wheat or cracked corn placed in the scratching place to give them exercise during the day.

Above all things keep the hen-house clean and ventilated.

Do not crowd too many in one house. If you do, look out for disease.

Use carbolic powder in the dusting bins occasionally to destroy lice.

Wash your roosts and bottom of laying nests and whitewash once a month in winter.

Let the old and young have as large a range as possible, the larger the better.

Don't breed too many kinds of fowls at the same time, unless you are going into the business. Three or four will give your hands full.

Introduce new blood into your stock every year or so, by either buying a cockerel or sittings of eggs from some reliable breeder.

In buying birds or eggs, go to some reliable breeder who has his reputation at stake. You may have to pay a little more for birds, but you can depend on what you get. Culls are not cheap at any price.

Save the birds for next year's breeding and send the older to market. In shipping fancy poultry to market, send it dressed.

For the manner of killing, packing, shipping, etc., of fowls, see Poultry. For mode of Caponizing, see article on that subject.

To Cook Fowl. *To Boil.* They should be cleaned and stuffed as for roasting. A young fowl requires an hour; if tough and old, three hours. A chicken will boil in three-quarters of an hour. They may be served with oyster, caper or egg sauce.

Roast Fowl. It is picked, nicely cleaned and singed, the neck is cut off, the fowl washed. It is trussed, and dredged with flour, and when put down to roast, basted with butter. A good-sized fowl will require above an hour to roast. Make a rich gravy from the drippings, add butter, a little thickening, and the inwards nicely chopped, after you have boiled them soft. An hour is enough for common-sized chickens to roast. A smart fire is better than a slow one; but it must be attended closely. Slices of bread, buttered, salted and peppered, make excellent filling.

Stewed Chicken. Divide a chicken into pieces by the joints, and put into a stewpan with salt, pepper, little parsley and thyme; pour in a quart of water, with a piece of butter; and when it has stewed an hour and a half, take the chicken out of the pan. If there is no gravy, put in another piece of butter, add some water and flour and let it boil a few minutes. When done, it should not be quite as thick as drawn butter. For dumplings, take 1 quart of sifted flour, 1 teaspoonful of salt, 2 of cream tartar and 1 of soda; mix well with milk and form into biscuit; place them upon a tin in a steamer over the kettle where the chicken is boiling. They will steam in 20 minutes. You can rub a little butter in the flour if you wish them very nice.

Chicken Fricassee. After preparing a couple of nice chickens, joint them, dividing the wings, side, breast and back-bone, and let them lie in salt and water ½ an hour; remove them then to a stewpan, with ½ a pound of good, sweet, salt pork, cut up in pieces; barely cover with water and simmer on the top of the stove or range for 3 hours; when sufficiently tender, take out the chicken, mix a tablespoonful of flour smoothly with cold milk, and add a little fine dried or chopped parsley, sage and thyme, or summer savory and stir gradually into the liquor; keep stirring till it boils; season with pepper and salt to taste; and then put back the chicken and let it boil up for a few moments in the gravy; garnish with the green tops of celery.

Chicken Pot Pie. Divide the chicken into pieces at the joints; boil until part done, or about 20 minutes, then take it out. Fry 2 or 3 slices of fat salt pork, and put in the bottom, then place the chicken on it with 3 pints of water, 2 ounces of butter, a tablespoonful of pepper, and cover over the top with a light crust, made the same as for biscuit.

Fowling, the killing or taking of birds for the sake of their flesh, feathers, etc.

Fowling Piece, a light gun for shooting fowls or birds.

Foxed, discolored or stained: said of timber and of paper in printed books.

Fox Evil, a kind of disease in which the hair falls off. See Hair and Baldness.

Fracture, a break or separation in the bone of an animal, from external violence. When the impaired bone is simply cracked or broken through, the fracture is simple; where the bone is bruised, crushed, or broken into splinter or fragments, the fracture is compound; and when the bone is merely pushed out of its socket, without being cracked or splintered, the injury is a dislocation. When a simple fracture occurs near a joint, it is liable to be mistaken for a dislocation. The chief cure for a simple fracture is to adjust the broken parts accurately to each other, and fix them in their position by means of wooden splints and strong bandages; the chief cure for a compound fracture is to saw away projecting splinters, clean and close the wound, adjust the chief parts of the broken bone, soothe with fomentations and support with soft bandages till cicatrization be effected, and then proceed as in simple fracture; and the chief care of a dislocation, unattended by crack or splinter, is to bring back the displaced bone into the socket, and apply either plaster or bandage.

The reduction of a fracture in any important bone of the horse is so very difficult to be effected, and so uncertain in its restorative effects, and would be followed by so long a period of inactive and expensive feeding, that horse-owners scarcely ever think of attempting it, but consign the animal to destruction. Yet many a fracture which condemns a horse to death would be cured if the proper surgical skill could be obtained. See Horse.

Free-Martin, the seemingly female twin of a bull calf. The majority of apparent heifers which have been produced as twins of bull calves are more or less hermaphrodites; and some possess an almost equal balance of the peculiar organisms of male and female; and all these are necessarily and irremediably barren; but a few have a sufficiently distinct and full development of all the female organs to be true heifers and fully capable of becoming productive cows. Thoroughly hermaphrodite free-martins have a lumpish appearance proper to neither cow nor bull; and if they belong to a good breed, they are excellent fattening animals for the market.

Freezing Mixture, WITH ICE OR SNOW. Mix ⅔ snow or pounded ice with ⅓ muriate of soda. This will reduce temperature to 5° below zero. A mixture of 12 parts of snow or pounded ice with 5 each of muriate of soda and nitrate of ammonia will reduce to 25° below zero. Snow or ice with common table salt reduces to 4° below zero.

WITHOUT ICE OR SNOW. Equal parts of water and nitrate of ammonia reduce the thermometer to 4° above zero. Five each of nitrate of ammonia and nitrate of potash with 16 of water lowers the temperature to 10° above zero. Muriate of ammonia and nitrate of potash, 5 parts each, sulphate of soda, 8 parts, with 16 of water, reduces to 4° above zero. Sulphate of soda, 8 parts, to 5 of muriatic acid, reduces to zero.

Freezing Point, denotes the point or degree of cold shown by a mercurial thermometer, at which certain fluids begin to freeze, or, when frozen, at which they begin to thaw again. On Fahrenheit's thermometer, the one generally used in this country, this point is at 32° above its zero point, for water, and at 40° below for quicksilver, these fluids freezing at those two points, the process of freezing being due to the cold air absorbing its warmth. Water, therefore, freezes from the surface downward. The property of nearly all liquids is to contract as they grow cold; but amongst the exceptions to this rule is water, which contracts only until it reaches the temperature of 40° Fahrenheit, below which it expands or becomes lighter, being converted into crystals which pack less closely than the particles of water do. It is by virtue of this most important quality that a day's frost does not suffice to turn all our river and lake water into vast masses of ice, which could never be dissolved. At a small depth water always retains a temperature of 40°, because when its temperature sinks below this point, it ascends to the surface, and there freezing remains until it is melted. A piece of ice—frozen water—is lighter than the same bulk of water in a liquid state, because of its expansion by freezing. It is to this expansion of water that we owe the bursting of water-pipes, water sewers, and the splitting of tiles, stones and rocks. To it is also due the refreshment of the earth by the admission of dew, rain, and gases favorable to vegetation. Extreme cold causes water to expand, as we have already explained that extreme heat does. Running water freezes more slowly than still water, and shallow water freezes more readily than deep water. Salt water never freezes until it is four or five degrees below the freezing-point of fresh water; for which reason salt dissolves ice. Some lakes rarely freeze, because their water is supplied from the bottom by springs. Water may be frozen artificially by wrapping a bottle of it in cloths kept constantly saturated with ether. There are various ways of freezing water, however, the most curious of which is perhaps that by which it may be frozen even in a red-hot vessel. This vessel should be of platinum. When it has been made red-hot, pour into it first a little water, and then some liquid sulphurous acid. Turn the vessel over and the ice will fall out.

MELTING POINTS. Mercury melts at 39°; ice at 32°; tin, 421°; lead, 594°; zinc, 740°; silver, 1,850°; brass, 1,900°; gold, 1,980°; copper, 2,160°; cast-iron, 2,700°.

FREEZING AND BOILING POINTS. Brandy freezes at 7°; ether boils at 98°; alcohol boils at 174°; linseed oil boils at 600°; mercury boils at 630°. Iron is bright red in the dark at 750°, and at twilight, 850°; red-hot by day, 1,050°.

Fresco, a method of painting on walls, with mineral and earthy pigments on a freshly laid stucco ground of lime or gypsum. The pigments unite with the ground and become durable. The fancy figure work requires more skill than any one except a painter could exercise, and therefore the average farmer would rather employ a professional painter to do this kind of work than to undertake it himself. Frescoing is generally done on the lower portion of walls, and around the edge and in the center of the ceiling.

Fricassee (frik-a-see′), a dish of fowls or other small animals cut into pieces and dressed or fried; also, to dress such meats in this style.

Fritter, a small pancake of fried batter, or a piece of meat fried.

BATTER FOR FRITTERS. Mix 8 ounces of fine flour with about ½ pint of water into a smooth batter, dissolve the butter over a slow fire, and then stir it by degrees into the flour. Then add the white of 2 eggs whisked to a stiff froth, and stir them lightly in.

ARROW-ROOT FRITTERS. Put 2 pints of milk, in a good-sized stew-pan, over the fire until it boils; have 10 ounces of arrow-root ready mixed, and stir it into the milk as quickly as possible; add a little vanilla and yolks of 8 eggs; the sugar the last. Stir it for about 20 minutes over a quick fire, then put it into a deep cutlet pan, and bake it about 10 minutes in a quick oven. When it is quite cold, cut out the fritters with a round cutter, and egg and bread crumb them, glaze and send them up quite hot.

APPLE FRITTERS. Beat and strain the yolks of 7 eggs, and the whites of 3; mix into them a pint of new milk, a little grated nutmeg, a pinch of salt, and a glass of brandy. Well beat the mixture, and then add gradually sufficient flour to make them a thick batter. Pare and core 6 large apples, cut them in slices about ¼ of an inch thick, sprinkle pounded sugar over them, and set them by for an hour or more; dip each piece of apple in the batter, and fry them in hot lard about 6 minutes; the lard should not be made too hot at first, but must become hotter as they are frying. Serve with sifted sugar over them.

CAKE FRITTERS. Cut a stale cake into slices an inch and a half in thickness, pour over them a little good cream, and fry them lightly in fresh butter, and when done place over each slice of cake a layer of preserves.

BREAD FRITTERS. To a quart-basinful of stale bread broken small, put a quart of boiling milk; cover it for 10 or 15 minutes. When quite soft beat it with a spoon until it is smooth, add 2 well beaten eggs, ½ a nutmeg grated, a tablespoonful of brandy, 1 of butter and a little salt. Beat it light; make an omelet-pan hot, put in a small piece of butter and when dissolved pour in sufficient batter to run over the pan; let it fry gently. When one side is a fine brown, turn the other, put butter and sugar with a little grated nutmeg over, lay on the other, cut them through in quarters, and serve them hot.

BLACKBERRY FRITTERS are made by mixing a thick batter of flour and sour milk, or cream, as for pancakes, only quite stiff. If cream is used allow one more egg than for sour milk, then stir thick with berries. Have ready a kettle of hot lard, dip a tablespoon into the lard, then take a spoonful of batter and drop it into the boiling lard; the grease will prevent the batter from sticking to the spoon and will let it drop off in nice oval shape. Eat with syrup.

CORN FRITTERS. To a dozen ears of corn, grated, add two eggs and a teaspoonful of salt. (If the corn is old add a little milk.) Fry in hot butter and lard, half of each.

HOMINY FRITTERS. Two teacupfuls of cold boiled hominy; add to it 1 teacupful of sweet milk and a little salt; stir till smooth, then add 4 tablespoonfuls of flour and 1 egg; beat the yolk and white separately, adding the white last. Have ready a pan with hot butter and lard (half of each), drop the batter in by spoonfuls and fry a light brown.

OYSTER FRITTERS. Bread some good-sized oysters, make a thick omelet batter with 4 eggs and a tablespoonful of milk, dip each oyster into the batter, and then into grated bread, fry them a nice color, and use them to garnish fried fish.

PARSNIP FRITTERS. Boil 4 or 5 parsnips until tender, take off the skins and mash them very fine, add to them a teaspoonful of flour, 1 egg, well beaten, and a seasoning of salt. Make the mixture into small cakes with a spoon, and fry them on both sides a delicate brown in boiling butter or beef dripping. When both sides are done, serve them up very hot.

RICE FRITTERS. Take 1 cup of cold rice, 1 pint of flour, 1 teaspoonful of salt, 2 eggs beaten lightly, and milk enough to make this a thick batter; beat all together well and bake on a griddle.

Frog, IN FARRIERY, an elastic, horny substance growing in the middle of the sole of a horse's foot, at some distance from the toe, dividing into two branches and running toward the heal in the form of a fork.

Frost, frozen dew; the act of freezing; ice frozen throughout a porous substance. "Black frost," cold so intense as to freeze vegetation and cause it to turn black without the formation of white or hoar frost.

Frozen limbs or parts; **Frost-Bite.** When the part is frozen, hold snow, ice or cold water to it until it is thawed out, keeping the patient in a cold room. Give no intoxicating liquors, for while such stimulants seem generally to hasten the warming up of the system and all the parts, it is at too great expense to the vital forces of the body. When, however, the whole body is simply chilled and no part really frozen, the sooner the sufferer can be put into a full warm bath the better. Else warm him up by a fire and much severe hand-rubbing. Free the bowels by a warm inlection, and give a bowl of warm gruel to drink.

Fruits. The earliest fruits mentioned in history are the grape, the apple and the fig, the former being cultivated about the time of the Deluge. The almond is mentioned repeatedly in the sacred records, nearly 4,000 years ago; and Theophrastus, who lived about 300 years before the Christian era, remarks "that it was the only tree in Greece that produced blossoms before the leaves;" hence we may safely infer the peach was then unknown. The fact that the Jewish history nowhere speaks of the peach, indicates that it was not a native of Persia, a country long inhabited by that people. It was known to the Romans, at the height of their power, and the nectarine was spoken of by Columella and by Pliny as an admired fruit of their time. The apple and pear were well known in the days of Pliny, who speaks of 22 varieties of the former and 36 of the latter. The cherry, a native of Pontus and some parts of Europe, was introduced among the Romans at the time of the Mithridatic war. The plum was known both to the Greeks and the Romans; and Pliny asserts "that they were grafted upon apple-stocks, producing what were called apple-plums, and upon almond-stocks, yielding both fruits, the stone being like that of an almond." And Virgil, with equal absurdity, speaks of grafting apples on plums, of adorning the wild ash with the blossoms of the pear, and represents swine crunching acorns under elms; nor is it very long since a few equally singular notions were held by a few moderns.

The cultivation of fruit in Great Britain began to receive attention with other rural improvements. The earliest British writer on this subject was Richard Arnold, who published a chapter in his "Chronicles," in 1502, on the craft of grafting, planting and altering of fruits as well in color as in taste. He was succeeded about 1538 by Tussier; in 1559 by Gerard; in 1629 by Parkinson; in 1658 by Evelyn; in 1724 by Miller; in 1791 by Forsythe; soon after which the great improvements introduced by Mr. Knight and followed by Lindley, Thompson, and others, formed a new era in the cultivation of fruit in England.

In the United States the growing of fruit has kept pace with the rapid progress in other branches of industry. The cultivation of almost all the fruits are as universal as husbandry itself. Nearly every farm, however small, has its orchard and fruit garden, while many large farms are devoted exclusively to fruit. Within the last 40 years in this country more excellent varieties have been given to the world than in all ages before. Varieties are now propagated adapted to early and late ripening, etc. One of the greatest difficulties yet remaining, is the confusion in the names of varieties. The very slight shades of difference in many; the impossibility of accurately defining these shades in written descriptions, and the change produced in them by soil, situation, climate and culture have largely contributed to this difficulty. It has also been increased by looseness, carelessness, and want of precision in descriptions, and especially the almost total neglect of a classification of flavors, usually the most unvarying and great decisive point of distinction in varieties. Some individuals who have cultivated fruit, or studied extensive collections of pears and plums, may know at sight a considerable number of varieties, but in general very few sorts are known by one individual; and in the great majority of cases a professional gardener can speak with confidence regarding those sorts only which are under his care. The reason of this is, that the shades which distinguish varieties are so fleeting as not to be retained in memory, or retained only to a very limited extent. An apple may be distinguished from 20 other apples all very much alike, when the whole 20 are placed together before the eye; but any one of the 20, taken apart, and delineated and described, however perfectly, will hardly present any marks sufficiently distinct to be remembered, and by which it may be recognized with any degree of certainty. The great number of names given to one fruit either from ignorance or to promote its sale have added to the confusion.

Fruits ripen by absorbing oxygen and evolving carbonic acid, a process chemically opposite to that performed by leaves, and strictly analogous to that of animal respiration; they generally conduct this process with a vigor and amplitude proportioned to the play of sunshine which they enjoy; and during the whole of its progress they acquire grape sugar either from the transmutation of a portion of their acid or from other sources. Their ripening, therefore, comprises a change from a sour to a sweet condition; and this change is always more complete in sunny than in cloudy seasons.

The chemical nature of the process of ripening suggests how that process may be either accelerated or retarded, how the fresh state of delicate fruits may be prolonged, and how the air operates on mature fruits to make them decay and rot. The grand art of preserving freshness is to pull the fruit before they are quite ripe, and close them up from the pressure of free or atmospheric oxygen. In some cases, simple immersion in carbonic acid is sufficient; and in all, the laying of a paste of lime, copperas and water, at the bottom of jars to absorb oxygen, the placing of the fruit in the interior of the jars, but out of contact with the paste, and the thorough covering or cementing of the jars so as to exclude the air from without, are eminently successful. In this latter way, peaches, apricots, prunes, and several kinds of plums will keep quite fresh from 20 to 30 days; and pears and apples will keep quite fresh for three months and more. The process of decay, like that of ripening, absorb oxygen and evolves carbonic acid, but instead of adding to the sugar, it destroys and dissipates all which previously existed.

THE MOST PROFITABLE MARKET VARIETIES OF FRUIT. The chief requisites in all fruits for market purposes are firmness, color, quality and size, in the order named. Take for instance the apple; a bright red is the most popular color; hence Steele's Red, Winesap, Willow-Twig, Jonathan, Baldwin and even the Ben Davis are preferred to a better apple of a poor, dull, or rusty color. Take the Baldwin when it is of a bright color, it will sell at fifty per cent. better price on the same date than when it is shown of a dull color. There are many points to be considered in relation to the profitableness of certain varieties, even when the best qualities in their best color are presented on the market, which fruit-growers should consider. Among the varieties for profitable planting are the Baldwin, Steele's Red, Willow-Twig, Spitzenberg, Wagner, Newtown Pippin, Jonathan. Next in order would be the Pennock, Greening, Spy, Bellflower, Maiden's Blush, Red Astrachan, Ben Davis, Seek-no-further, Snow, Golden and Rox. Russets. Let it not be understood that the list should be limited as above. Those serve rather as types of the most profitable varieties. The apple list would not be complete without naming at least two crabs. The Hyslop and Transcendent are at the present time most salable of all the crabs, the Hyslop proving the most salable from the fact that Transcendent comes on our market too early for the demand; hence the Hyslop proves more profitable. See Apple.

Among pears, at present, and probably for the next generation, the Bartlett takes the highest rank as a market pear, and more of that variety can be profitably disposed of than all the other varieties put together. Clapp's Favorite, Flemish Beauty, Seckel, Louise Bonne, and Duchesse d'Angouleme are among the most salable on the long list of pears.

CHERRIES. The Black Tartarian is the most salable of all sweet cherries, with the Early Purple Guigne, Gov. Wood, and Napoleon Bigarreau following closely, with Early Richmond and May Duke as the leading sour or cooking cherries.

PLUMS. The Lumbard, Washington, and Green Gage for dessert, with Wild Goose for cooking.

PEACHES. The yellow-fleshed varieties have the preference over the white, such as Crawfords, Jaques' Rareripe and Smock's Free, with a notable exception in favor of the Old Mixon, one of our best shippers.

GRAPES. The Concord and the Delaware are the market grapes *par excellence*.

CURRANTS. The Cherry takes the lead.

Red Raspberries. The Brandywine is the best at this date, for late, among new berries. Reeder's Seedling for early. Next comes the Kirkland or Highland Hardy, with the Herstine and Turner, the latter proving not of sufficient firmness for reshipment.

Black Raspberries Doolittle, Miami and Mammoth Cluster.

The Strawberry being produced in the largest quantities of all our market berries, it is proper to occupy more time on this fruit. Therefore we give a list of varieties and pronounce on their merits solely in their relation as shippers to the markets. We name them in their alphabetical order:

Varieties.	Color.	Flavor.	Shipping Qualities.
Agriculturist.	Crimson	Good	Near market.
Boyden (Seth)..........	Dark Red	Sweet	"
B. Scarlet	Scarlet	Good	Worthless.
Capt. Jack.............	"	"	Good.
Chas. Downing.........	Light	Medium	Poor.
Champion..............	Dark Crimson	Good	Home market.
Crescent Seedling......	Bright scarlet	Poor	Worthless.
Col. Cheeney...........	Light scarlet	"	Near market.
Cumberland Triumph..	"	Medium	
Duchess................	"	"	"
Endicott No. 2.........	Dark red	"	"
Forest Rose	Bright red	Good	"
Glendale	Dull red	Poor	Worthless shippers.
Green Prolific..........	Scarlet	"	Near market.
Great American.........	Dark crimson	Medium	"
Jucunda................	Glossy "	Good	"
Kentucky	Scarlet	Fair	"
Lenning's White........	Light	Best	Too light in color.
Monarch of the West...	Light scarlet	Good	Near market.
Pres. Wilder	"	Best	"
Sharpless.......	Glossy red	Good	"
Triomphe de Gand......	Glossy Scarlet	"	Good.
Wilson's Albany..	Scarlet	"	"

The last two named on the list should be placed first as to order of merit when viewed in the light of market berries, for the following reasons: First, the Triomphe de Gand is the best of all the large varieties in combining all the requisites of a good shipping berry—size, color, flavor and firmness. Last, but not least, the Wilson's Albany, our old reliable and well-tried friend.

Keeping Fruit. If the following simple rules are observed fruit may be kept in a good condition for a long time.

1. As the flavor of fruit is so easily affected by heterogeneous odors, it is highly desirable that the apple and pear room should be distinct.

2. The walls and the floor should be annually washed with a solution of quicklime.

3. The room should be perfectly dry, kept at as uniform temperature as practicable, and be well ventilated, but there should not be a through draught.

4. The utmost care should be taken in gathering the fruit, which should be handled as little as possible.

5. For present use, the fruit should be well ripened; but if for long keeping, it is better, especially with pears, that it should not have arrived at complete maturity. This point, however, requires considerable judgment.

6. No imperfect fruit should be stored with that which is sound, and every more or less decayed specimen should be immediately removed.

7. If placed on shelves, the fruit should not lie more than two deep, and no straw should be used.

For the growing, varieties, marketing, keeping, etc., of the various fruits, see under their respective heads, and Orchard. See also Canning, Drying, Preserving, Pickling, etc.

Dessert Fruits. In America we have some wild fruits which are excellent for dessert, as the blackberry, raspberry, strawberry, huckleberry, cranberry, etc.; but we are mainly dependent upon cultivated fruits for our fancy or dessert dishes. We will here notice each in its alphabetical order, with remarks on their dietetical qualities and manner of using them, premising that all fruits consist mainly of water, and dietetically are but little more than a drink. They all contain also sugar, acid and mucilage. The different berries, as a general rule, contain a larger proportion of free acid than stone-fruit or apples and pears; and their acidity is the more obvious to the taste from their containing relatively small quantities of gum and pectine.

Those persons who use little or no salt in their food prefer sweeter fruits than others do, and those who use an excess of salt can scarcely satisfy themselves with fruit acid. To digest and assimilate the more abundant nutrition, therefore, from sweet fruits, without salt or cream, belabors the system much less than the method most in vogue in Europe and the United States. This, more than anything else, controls the matter of taste with reference to fruit-eating.

Apple. Apples of the very best variety are sometimes of poor quality, owing to adverse circumstances connected with their growth and ripening. For example, one eats a good apple of the Æsopus Spitzenberg variety, likes it, and afterward he is on the look out for more fruit of that kind. In the course of time some apples are offered him as Æsopus Spitzenberg, he eagerly seizes one, anticipating a rare treat; but alas! it tastes somewhat different in nearly all respects and very poorly in one or two, and he suspects they are not of the variety represented. In regard to nearly all fruits we are subject to such disappointments. Hence we are under the necessity of "sampling" a lot before purchasing or selecting, and even then, in filling a dish for the table we incur the risk of throwing in some poor apples. It appears that the "variety" brand of an apple is no more a guaranty of its intrinsic quality than the trade brand of manufactured products is a guaranty of them.

Previous to cooking, the apple consists of a large number of minute cells and vessels, which hold the pulp and the acid, which we term the juice. The application of heat causes these cells to expand and burst, and as the temperature increases the water partly evaporates in the form of steam. In this condition they are most wholesome, and therefore apple pie, if not over-spiced, is rightly regarded as highly nutritive, and at the same time easy of digestion. The aroma of apples, to which their various kinds of flavor seem intimately allied, is supposed to act as a mild stimulant and to aid digestion, and therefore those apples which have the finest flavor are esteemed best. The harder varieties, such as the pippins, having in a greater degree the woody-fiber element, are less desirable as food. The dry, mealy kind of apples are highly nutritive. The watery apples are generally crude, cold, and ill adapted to weak stomachs till cooked, when all apples become wholesome and good for food. By the process of cooking the freed acid and pulp appear to enter into union, and the pulp containing saccharine, also disengaged by the heat, mixes with and modifies the acid. Ripe, sweet, mealy apples have a laxative effect on the bowels, but the sour, astringent fruit is to be avoided, especially by those who follow sedentary pursuits, or those who indulge freely in wine or spirits. Costiveness, griping, and flatulency are then likely to result from eating them.

Banana. This has more available nutriment than any other fruit in the world, and more nutrition per acre can be raised in bananas or plantains than in any other vegetable product, either fruit, grain or vegetable. But as many persons do not like them it is scarcely proper to serve them as dessert at a fashionable meal. Their quality is never so good after they are shipped to distant countries. The papaw of the United States is similar to the banana in odor, taste and other qualities, but they are far inferior as an article of diet. A taste for these two fruits, like that for tomatoes, is seldom inherited, but has to be cultivated.

Blackberry. This is a first-class fruit for dessert. Being somewhat astringent, many persons cannot eat many of them with perfect impunity. They are in their best edible condition when they have hung upon the bush about as long as they will, and are soft and mellow. Like black grapes, they are too liable to be picked as soon as they turn black, and long before they are sufficiently mellow. The flavor of the blackberry in pies is unsurpassed, if the cook is not so unskilled as to injure it in some way.

Cherry. Those kinds which contain the largest proportions of water and sugar, fermenting easily, are apt to produce flatulence and colic; but others, which contain a large portion of water and acid, being slightly stimulating, are more wholesome and digestible; but the best are the pulpy, mucilaginous kind. Cherries may be eaten without fear when they are quite ripe. The kernels of cherries contain a small proportion of prussic acid. Care should be taken to guard against the accidental swallowing of cherry stones, as they sometimes lodge in the bowels and produce obstructions.

Cranberry. This fruit, though unfit to be eaten raw, is, when cooked and thoroughly sweetened, one of the most popular desserts in existence, on account of its fancy flavor. The main objection to them is, they, like gooseberries and currants, require a great deal of sugar to render them eatable. Cranberry sauce is generally eaten with roast fowl.

Currant. The black variety is the most bland and nutritious, but is not so universally liked as other kinds. The red Dutch is the most popular as to flavor, and both this and the white Dutch are the best to raise in the United States. The white is not so acid as the red, nor indeed so rich; both are beautiful enough. In cooking them they require an immense amount of sugar. Either cooked or uncooked they are appropriate as dessert. The cherry currant is the largest, but most difficult to raise. The acid of the currant and gooseberry is said by the physicians of the day to be somewhat injurious to those who are given to weakness in the urinary system.

Date. Dates constitute an appropriate dessert fruit, both stewed and unstewed. They are fine when cooked with tart apples. They vary in quality, as found in the American markets, according to their price, all the way from five to forty cents a pound, the cheaper kinds being wormy and dirty.

Fig. Excellent, both raw and cooked; are very fine when fresh from the tree. They are nutritious, and contain a large portion of sugar without acidity or oiliness, but require a longer time for digestion than most fruits do.

Gooseberry. About like currants. The skins are indigestible and should not be eaten. Ripe gooseberries are far more bland and wholesome than green.

Grapes and Raisins. The pulp of grapes constitutes the best sauce for invalids in the world. The "grape cure," so called, is increasing in popularity. This fruit, in its fresh state, is also fine for dessert at the most fashionable tables. It exceeds all other fruit in its amount of sugar, which is seldom less than 12 and sometimes reaches 26 per cent. In good kinds and in favorable seasons, the ratio of the sugar to the acid is as 29 to 1. When the ratio falls to 10 to 1 the grapes are unripe and acid. In other fruits this would be a high ratio and they would be called sweet. The anomaly may be thus explained: In unripe grapes the skins are very thick, and contain an extremly acid juice, which overcomes the sugar contained in the interior of the berry. The peculiar acid of grapes is denominated "tartaric," which, combined with potash, forms "cream of tartar.' Raisins are certain semi-tropical varieties of grapes, dried in a peculiar manner. The skins and seeds are indigestible, and the seeds, particularly, should not be eaten at all. It is not fashionable to pass raisins around as dessert except with nut kernels.

Huckleberry (or whortleberry). This fruit, stewed, makes a good dessert. It is also excellent for pies and to eat uncooked. Very digestible. The blueberry variety is the largest and generally preferred. It is a botanical curiosity that the blueberry and the cranberry are set down by scientists as belonging to one genus, while the huckleberry is placed in another. These fruits are easily shipped to great distances, and all the farmers in the West can have them in perfection.

Lemon. This is too well known to need description. Although it is not strictly a dessert fruit, its juice and its rind are the most popular flavoring elements in fancy dishes. The acid of lemons and oranges is regarded as not only wholesome but also highly corrective of vitiated conditions of the stomach and even of the whole system.

Melon. Muskmelons and watermelons are strictly dessert fruits, and in their season are proper at fashionable tables. The neatest way to eat them is with a teaspoon, from the rind, their natural dish, but this is not in accordance with etiquette at the present day. About 95 per cent. of the watermelon is water, and the largest portion of the remainder sugar. On account of the organic character and dietetic purity of the water, the lacteals absorb more of it than the system needs, and the surplus passes off by the urinary organs. Hence it is called a "diuretic."

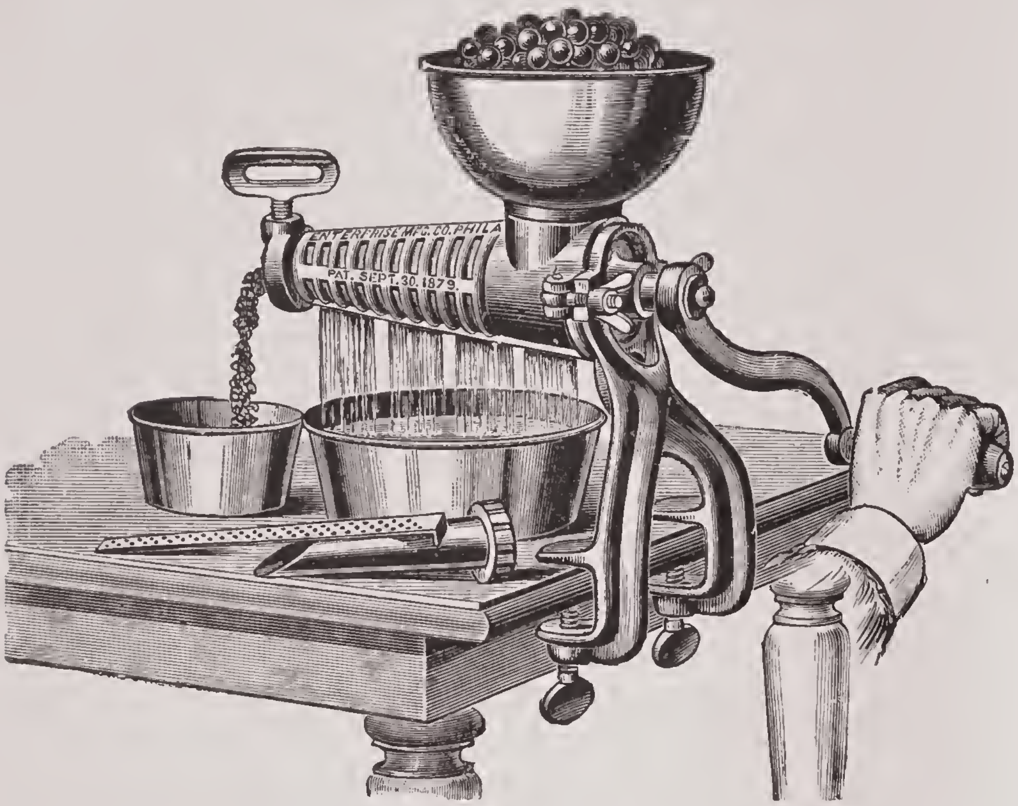

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Fig. 1.—*Fruit Press.*

Orange. A first-class dessert fruit. The peel (rind) is excellent for flavoring, but the oil which it contains is strictly an unassimilable drug, like any other spice. Both the outer and the inner (the white) rinds should be removed before eating. Orange juice, without the fiber, is particularly excellent for invalids as a substitute for the usual beverages.

Peach. This fruit is esteemed both for its tender flesh and its powerful but delicate aroma, although it requires longer time for digestion than most fruits. It is characterized, chemically speaking, by prussic acid, which abounds in its congener, the almond; but, as with all chemical elements, when organized in a first-class article of food, it is as different, dietetically, as air is from nitric acid, these two substances being composed of the same elements. Peaches, like apricots, consist almost entirely of juice, their solid constituents, after the removal of the stone, being only one or two per cent.

Pear. This is one of the sweetest of fruits and very nutritious, but is not so digestible as the apple. Unlike most other fruits, autumn and winter pears should be gathered from the tree before they are fully ripe and kept in the house until they are soft or mellow. They must, however, be kept warm, as cold destroys all their best qualities and renders them hard and tough.

Pine-apple. Although the acid and peppery qualities of this finely flavored fruit render it difficult of management by weak stomachs, it constitutes, when pared, sliced and saturated with the best sugar, a fancy dessert. It is not the fruit of a tree, but of a moss-like plant.

Plums and Prunes. Perfectly ripe plums are good to eat in considerable quantities, are very digestible and somewhat laxative. The same may be said of nectarines and apricots. Sometimes these stone fruits are ripe on the side exposed to the sun while unripe on the other, in which case only the ripened side should be eaten. Prunes bear the same relation to plums that raisins do to grapes, and are probably the most digestible of all dried fruits, while they are as wholesome as any.

Strawberry. The acme of dessert fruits. It is the aroma that we chiefly prize. The sweeter the more wholesome, as cream and fruit acid together form a kind of indigestible cheese in the stomach. Special pains are required to furnish them free from sand and dirt.

Watermelon. See Melon, above.

Fruit House, a house for the preservation of fruit in its natural state. It is either the ice-house itself, with a room underneath for fruit, or a conservatory built upon the principle of the ice-house, to preserve fruit during the winter season. These are eminently profitable, and those who are raising fruit in large quantities should provide themselves with a house especially adapted for their preservation.

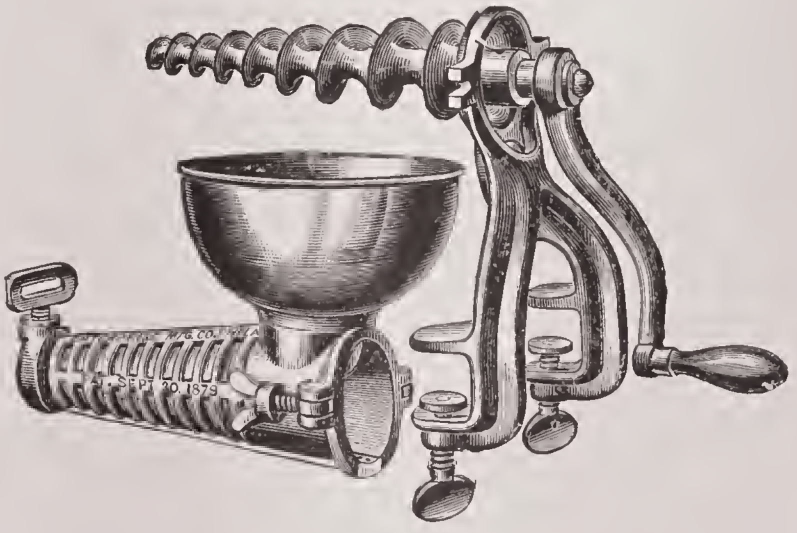


Fig. 2.—*Fruit Press Taken Apart.*

Fruit Press, an apparatus for pressing out the juice of fruits. Every family should have one. Fig. 1 represents the kind made by the Enterprise Manufacturing Company, of Philadelphia. Fig. 2 represents the same taken part. It is easily taken to pieces, for the purpose of washing, drying and oiling. The apparatus is screwed to a table like a small sewing machine or seam-holder, the fruit put into the hopper, and as it is pressed, the skins and seeds are neatly held within the tube until they are passed out at the smaller end. The stone fruits should first be pitted; all other fruits, as well as pumpkin, and all pulpy matter, can be run right through without any previous preparation.

Fuel, combustible substances used for the production of heat. In this country fuel is generally understood to mean either coal, wood, charcoal or coke. Throughout the northern portion of the United States coal is the fuel in most general use. In timbered sections, and where coal is not a local product, wood is used either in its original state or in the form of charcoal.

COAL. There is no possible doubt that the general origin of coal must be referred to the vegetable kingdom. Some species of coal are merely fossil wood (or lignite) impregnated with oily or bituminous matter. The branches, trunks and roots, although closely pressed together, are scarcely altered in texture in some places, while in others they gradually lose every vegetable feature; and the substance in color, luster and feature resembles pitch.

Coal is indeed the vegetation of former ages, the product of their sunshine and showers, treasured up for succeeding generations. The chief difference between the various kinds of coal which are applied to economical purposes arises from the proportion of bitumen they contain. What is called bituminous yields about 40 per cent. When burning it swells, agglutinates, and emits much smoke and gas, which inflame at a certain temperature. Cannel coal has only 20 per cent. of bitumen, and does not agglutinate or cake. It burns with a bright flame like a candle, from which circumstance it takes its name, cannel being the common pronounciation of candle in the north of England. The third sort is called anthracite. It contains little or no bitumen. It neither cakes nor flames, and gives out very little smoke. But as there are several varieties of coal between these principal species, much confusion has taken place in their names. The fact is that almost every mine affords a coal differing in some respects from that of others. The different manner in which coals burn deserves notice, and if any arrangement of the varieties of coal is to be made this affords the best ground for it. The difference does not depend wholly upon the proportion of bitumen, but partly upon the kind, whether it is more or less volatile, and whether it is more or less easily separated from the earthy base.

Anthracite is in general, geologically the oldest form of coal, and is the hardest and most dense. It generally contains upward of 90 per cent. of carbon. It is an admirable fuel, but requires that stoves and grates should be expressly adapted to its use. This coal is not found west of the Middle States. The soft or bitminous coal is soft and friable, which is therefore more wasteful. It is very rapid in its combustion.

Coal is said to be about twice the value of wood as fuel, weight for weight, in its heating power. The great value of all fuel resides in the degree of heat it gives. The heat-giving constituent of coal, carbon, varies from 75 to 95 per cent. Coal radiates more heat than charcoal. One pound of good pit-coal will upon an average heat 60 pounds of water. Small coal gives out three-fourths of the heat afforded by large coal.

CHARCOAL. Different charcoals afford under equal weights equal quantities of heat. One pound of charcoal will, on an average, raise 73 pounds of water from the freezing to the boiling point. If exposed to the air, charcoals acquire moisture, and are then inferior in the heat-giving property. Such charcoal may be known by its burning with flame, as pure charcoal does not. Charcoal radiates heat in the degree of one-third to the whole of the heat it emits.

COKE. The heating power of good coke is to that of pit-coal as 75 to 69, and is equal to nine-tenths of that of wood charcoal.

TURF OR PEAT. One pound of this fuel will raise from 25 to 30 pounds of water from the freezing (32° above) to the boiling point, 212°. Its value depends upon its compactness and freedom from earthy matter. Its radiating power is as one to three of the whole heat it emits in burning. Peat is not common in the United States on account of the rarity of the peculiar swamps where it is found. In northern Indiana, and in some portions of Wisconsin, there are rather extensive bogs of peat.

WOODS of various kinds, if burnt under the same conditions of weight and dryness, are found to afford equal degrees of heat. The pores of dry wood are filled with air (oxygen). Dryness is an essential quality of good fuel, as the presence of moisture prevents the oxygen of the air from penetrating the material burnt. If a piece of wood is damp, heat is wasted in the evaporation of the water it holds, and the combustion is also slower and more imperfect. A piece of wood containing, say 25 per cent. of water, contains only 75 per cent. of fuel, while the conversion of the water into steam will require one 28th part of its weight. Hence, damp wood is of less value as fuel by 28 parts in 100. According to their different natures, wood still contains from 20 to 25 per cent. of water 12 months after it has been felled and cut up. Even when it has been kept for a long time in a dry place, it never contains less than 10 per cent. of water, although this may, of course, be reduced by heat. If dried too much, its value as fuel suffers from another cause, namely, the commencement of carbonization, or loss of hydrogen. It has been assumed that 1 pound of artificially dried wood will raise 35 pounds of water from the freezing to the boiling point.

Taking shellbark hickory as the highest standard of our forest trees, and calling that 100, other trees will compare with it in real value for fuel as follows:

Shellbark Hickory	100
Pignut Hickory	95
Black Jack (Oak)	97
White Oak	84
White Ash	77
Dogwood	75
Scrub Oak	73
White Hazel	72
Apple Tree	70
White Beech	69
Black Birch	65
Hard Maple	65
Black Walnut	62
Yellow Oak	60
White Elm	58
Red Oak	56
Red Cedar	56
Wild Cherry	55
Soft Maple	55
Yellow Pine	54
Chestnut	52
Yellow Poplar	51
Butternut	43
White Birch	43
Pitch Pine	43
Hackberry	42
White Pine	30
Anthracite Coal, 1 ton	100
Bituminous Coal, 1 1-5 tons	100

The other sorts of ash, the elms, butternut, sycamore, willow, basswood and buckeye have but little substance, although they all burn well enough when dry. Green elm is the poorest of all, and next to it green water oak and the soft woods. By the foregoing one can calculate which is the cheapest and best fuel in his community from the price it brings there. Sometimes, in the West, even corn has been the cheapest fuel; sometimes sunflower stalks, and other things. Perhaps the best and simplest way of discovering the respective heating powers of various kinds of fuel is by testing them with ice, thus: One pound of good coal liquefies 90 pounds of ice; one pound of good coke liquefies 95 pounds of ice; one pound of good wood charcoal liquefies 94 pounds of ice; one pound of wood liquefies 52 pounds of ice; one pound of peat liquefies 19 pounds of ice; one pound of hydrogen gas liquefies 370 pounds of ice.

Fulcrum, the support upon which a lever is rested.

Fumigation, or disinfecting the air, the artificial diffusion of medicated smoke or pungent gas through a house or apartment for the neutralizing of infection or destroying insects. There is no doubt that, in limited spaces, as in crowded ships, jails and hospitals, and particularly where cleanliness is neglected, or in confined apartments where infectious fevers exist, the atmosphere is loaded with certain exhalations, germs, fumes or vapors which are the cause of contagion. For rooms, etc., muriatic acid and nitric acid fumes have been used with success. To employ muriatic acid, put some common salt into an earthen dish and pour upon it some sulphuric acid; immediately whitish fumes will arise, which consist of muriatic gas; they will blend with the air and become invisible, but their presence will be perceived from their suffocating smell. Place a two-ounce vial full of the fuming nitrous acid, with the stopper out, on the mantle-shelf in the rooms which it is wished to guard from infection. Another method to remove close, unpleasant smells from apartments, is to put one spoonful of common salt and a little powdered manganese in a flat earthen saucer, and add at four or five different times a wineglass of strong sulphuric acid. Place this on the floor of the room, retire, and close the door.

For out-door purposes, chloride of lime and chloride of soda are the substances now used as the most convenient and effectual remedies for the purpose of disinfecting. Tobacco smoke, camphor, and vinegar are also good. See also Disinfectants.

Fungus (plural, fungi), mushroom growth of any kind, including nearly all the microscopic vegetation.

To the botanist the fungi are a most interesting class of plants. Their seeds (spores) and many of the resulting plants are so small that they must be examined with the microscope to bring out their character. What are understood as fungi by the ordinary observer, are toad-stools and puff-balls. Smut, mildew and rust are generally termed blight; yet they all belong to the larger class of fungi, the more minute forms below those of mildew being largely in excess of those larger than mildew. Fungus attacks all plants, especially those in a more or less diseased or disorganized condition. Fungus sometimes does attack apparently healthy trees. It attacks all living trees, and also is one of the means of the decomposition of dead plants. It is propagated by spores, minute grains which perform the function of seeds.

FUNGI AS A CAUSE OF DISEASE. Much has been said and written of late years of minute fungi being the cause of disease. Dr. Lassaure has made experiments with penicillum, etc., and concludes from them that fungus is not a cause, but an accidental presence. "In contradiction of Hallier, and," says Prof. McClure, "I might truthfully say of many other persons, it has been shown that nothing is to be gained in the study of the causes of disease by cultivating microscopic fungi, and it cannot be regarded as a contagious element until we have succeeded in producing disease from art."

Furniture, TO CLEAN. Take a quart of stale beer or vinegar, put a handful of common salt and a tablespoonful of muriatic acid into it, and boil it for 15 minutes; it may be kept in a bottle and warmed when wanted for use. Having previously washed the furniture with soft hot water, to get the dirt off, wash it carefully with the above mixture.

Very nice furniture, as a piano, should be treated as follows: Wash in very nearly cold water with a very clean, soft rag, and wipe dry; next, rub it all over with sweet oil and let it stand an hour or more; then rub off all the oil with a towel.

TO RESTORE. The best mixture we can find is, 3 parts linseed oil and 1 part spirits of turpentine. Put on with a woolen cloth. It restores wood to its original color and leaves a luster upon the surface.

TO TAKE BRUISES OUT OF FURNITURE. Wet the bruises with warm water, place a brown paper folded four or five times upon it and apply a warm (not hot) iron to it and the bruise will rise to the surface.

TO POLISH. Take 2 ounces of beeswax and ½ an ounce of alkanet root; melt them together in an earthen pot; when melted take it off the fire, and add 2 ounces of spirits of wine, and ½ a pint of spirits of turpentine. Rub it on with a woolen cloth, and polish it with a clean silk cloth.

Another: Shave 1 cent's worth of beeswax into thin slices, put it into a gallipot and pour on it 3 cents' worth of turpentine; melt in an oven, take it out and let it stand until cool; apply it briskly to the furniture with a piece of flannel, rub with a soft duster, and finally polish with an old silk handkerchief. Good also for cleaning oil-cloth.

TO VARNISH. White wax, 2 ounces; oil of turpentine, 1 gill; melt the wax and gradually mix in the turpentine. Lay on evenly, with as few strokes of the brush as possible and with haste, as varnish "sets" quickly, and is only roughened with the brush after setting.

Furrow, the long narrow trench made by the plow in tilling land. It means sometimes the temporary trench made by each line or bout of plowing, more generally the permanent trench which divides two ridges, and occasionally the narrow surface drain which is formed across the ends of these, and which receives and carries off their discharge of water; and in the first of these senses it may be called the plow-furrow, in the second the ridge-furrow, and in the third the cross-furrow. The operation of furrow-draining is designed to draw off surface water by means of the ridge-furrows and the cross-furrows; and a somewhat analogous operation draws off surface water from tilled clay lands by means of small and narrow spade-cuts, called water furrows. See the article Draining. A furrow-slice is the strip of soil cut out and turned over by the plow in each bout of plowing. The *rationale* of turning of furrows by the plow is not understood by one farmer in ten, even by those who profess to be plowmen. Very few of the ordinary hands of the farm understand how to turn furrows so they shall lap evenly, or fall beside each other, in lap-furrowing, in contradistinction to lying flat, and at the same time close together. So, in turning under stubble and other trash, sufficient care is not taken in cutting the furrows so the vegetation will be distributed evenly, and not in lumps, thus allowing the furrow to be smooth and evenly disintegrable throughout. The subject will be found treated of in the article Plowing. Furrows are known as "flat" when they lie level, and as "lapping" when they partly lie upon one another.

Furrow Slice, the strip of earth thrown out by the plow at one passing.

Furs. TO TAN SKINS WITH THE FUR ON. Cut off the useless parts, soften the skin by soaking, remove the fatty matter from the inside, and soak in warm water for an hour. Mix equal parts of borax, saltpeter and Glauber salts, in the proportion of about ½ ounce of each for each skin, with sufficient water to make a thin paste. Spread this with a brush over the inside of the skin, applying more on the thicker parts than on the thinner; double the skin together, flesh side inwards, and put it in a cool place. After 24 hours wash the skin clean, and apply in the same manner as before a mixture of 1 ounce sal soda, ½ ounce borax, and 2 ounces hard white soap, melted slowly together without being allowed to boil; fold together again and put away in a warm place for 24 hours. After this dissolve 4 ounces alum, 8 ounces salt, and 2 ounces saleratus, in sufficient hot rain-water to saturate the skin; when cool enough not to scald the hands, soak the skin in it for 12 hours; then wring out and hang up to dry. When dry repeat this soaking and drying two or three times, till the skin is sufficiently soft. Lastly, smooth the inside with fine sand-paper and pumice stone.

TO CLEAN FURS. Strip the articles of their stuffing and binding, and lay them as much as possible in a flat position. Give them a very brisk brushing with a stiff clothes-brush. After this any moth-eaten parts must be cut out, and be neatly replaced by new bits of fur to match.

TO CLEAN DARK FURS. Sable, chinchilla, squirrel, fitch, etc., should be treated as follows: Warm a quantity of new bran in a pan, taking care that it does not burn, to prevent which it must be actively stirred. When well warmed, rub it thoroughly into the fur with the hand. Repeat this two or three times, then shake the fur, and give it another sharp brushing till free from dust.

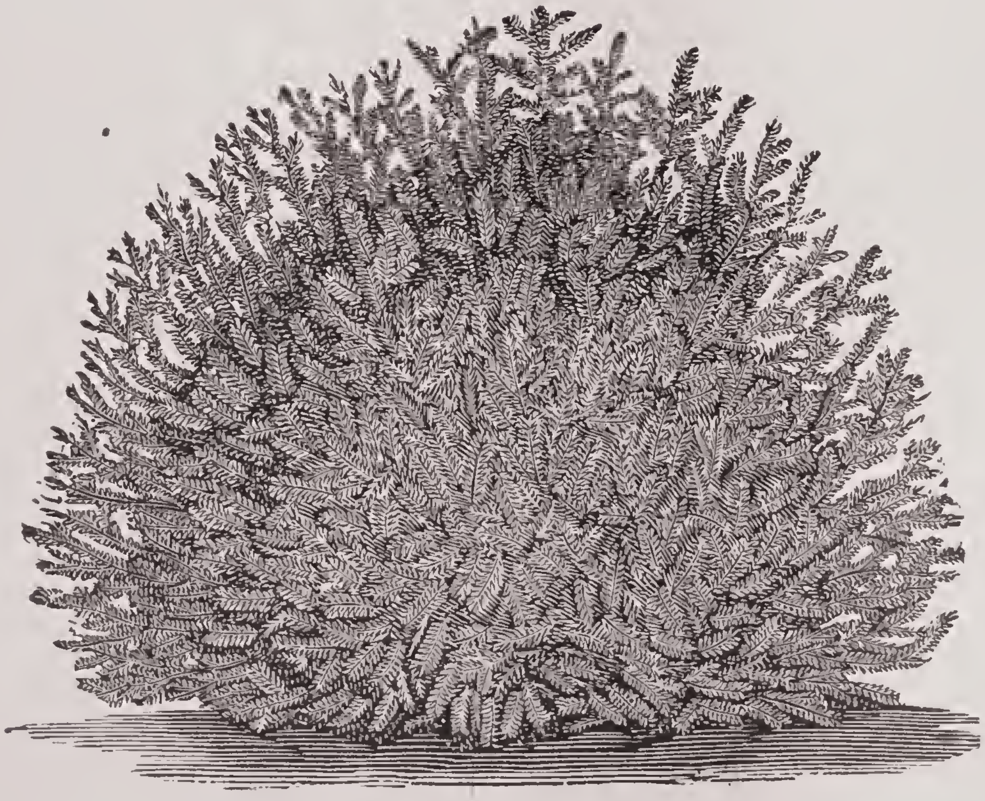
TO CLEAN LIGHT FURS. White furs, ermine, etc., may be cleaned as follows: Lay the fur on a table, rub it well with bran made moist with warm water; rub till quite dry, and afterward with dry bran. The wet bran should be put on with flannel, and the dry with a piece of book-muslin. The light furs, in addition to the above, should be well rubbed with magnesia or a piece of book-muslin, after the bran process. Or dry flour may be used instead of wet bran. Ermine takes longer to clean than minever. They should be rubbed against the "lay" of the fur.

PRESERVING FURS FROM MOTHS. It is not the moth, but the maggot of the moth, that does the mischief with furs and woolens. The instinct of moths leads them to deposit their eggs at the root of the fine hair of animals. No sooner is the worm hatched than it eats its path through the fur and continues increasingly destructive until it arrives at its full growth, and forms itself a silk covering, from which in a short time it again emerges a perfect moth. To effectually preserve furs from these insects thoroughly beat the furs with thin rattans, air them for several hours, then carefully comb them with a clean comb, wrap them up in newspapers, perfectly tight, put them away in a perfectly closed chest, lined with tin or cedar wood. Take them out and examine in the sun at least once a month, thoroughly beating them. This, indeed, is the secret of fur dealers in preserving their stock. Camphor, which is so much used to preserve furs, impairs their beauty in turning them light. The printing ink on the newspaper is just as effectual as camphor, being very distasteful to the moth. Keeping them in perfect darkness is considered by some to be sufficient. Another cause of the decay of furs is the moisture, to which they are so often exposed and by allowing the skin to remain damp, from which the delicate structure of the fine fur is sure to receive serious damage. This fact makes the leather manufacturer wet his skins and keep them in a damp cellar, in order to facilitate the removal of the hair, which can then be readily pulled out. It follows, therefore, that for the preservation of furs, dryness is essential. After exposure to damp or rain, furs should be dried at a moderate distance from the fire. Before putting furs by for the summer they should be carefully combed and beaten with a small cane. During the summer they should be taken out occasionally to be dried, if at all damp, and again well shaken, combed and beaten.

To Improve Furs by Stretching. Furs are usually much improved by stretching, which may be managed as follows: To one pint of soft water add 3 ounces of salt; dissolve. With this solution sponge the inside of the skin (taking care not to wet the fur) until it becomes thoroughly saturated; then lay it carefully on a board with the fur side downwards. Then stretch as much as it will bear, and to the required shape, and fasten with small tacks. The drying may be quickened by placing the skin a little distance from a fire.

Fusel Oil, known also as potato spirit, is a frequent impurity in spirits distilled from fermented barley, potatoes, rye, corn, etc., to which it communicates a peculiar and offensive odor and taste, and an unwholesome property. Any spirit which produces a milky appearance when mixed with four or five times its quantity of water may be suspected to contain it. To free alcohol from it, filter the alcohol through alternate layers of sand, wood charcoal, boiled wheat and broken oyster shells. This will remove all other impurities as well. Another method is to add a few drops of olive oil, shake thoroughly and decant; the olive oil dissolves and retains the fusel oil.

Fustian (fust'yan), a kind of coarse twilled cotton stuff, including corduroy, velveteen, etc.



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GABLE (ga´bl), the vertical triangular end of a house or other building, from the cornice or eaves to the top. A "gable roof" is the sloping roof which forms a gable. A "gable window" is one which is in a gable, or pointed at the top like a gable. The entire appearance of a residence, barn or other building may be beautified by simply ornamenting the gable; but care should be taken to avoid the common error of making such ornamentations too heavy.

Gadfly. The gadfly or bot-fly family belongs to the order of two-winged insects, which have their antennæ very short and inserted in two little holes upon the forehead; head large, eyes small, with large space between them; wings large, covering the balancers, and the hind body of the females with a conical tube bent under the body, and with which they deposit their eggs while flying. The larvæ inhabit various parts of the body of herbivorous animals. They are thick, fleshy, without feet, tapering towards the head, which in most cases is armed with two hooks, and the segments of the body are also armed with hooks or prickles. More than twenty species of this family are known; and several are found in this country.

Horse Bot-fly. There are three species which infest the horse. The large bot-fly, which lays her eggs upon the fore legs of the horse; the red-tailed bot-fly, which lays her eggs upon the lips, and the brown farrier bot-fly, which deposits her eggs under the throat. By biting the parts where the eggs are laid, the horse gets the larvæ into his mouth, swallows them, and to the coats of the stomach they cling and remain until they have attained their full growth. They then loosen their hold and are carried, together with the food, through the interior of the animal, fall to the ground and immediately begin to burrow. They remain under ground until they have undergone their metamorphoses and then emerge in the shape of the perfect insect.

Ox Bot-fly. This is the parasite found under the skin of cattle along the back, and is also known as the skin bot-fly. The fly is black and densely hairy, with thorax banded with yellow and white. They deposit their eggs in a place on the back of horses, and especially cattle. Accompanying the eggs is a small quantity of acid. The eggs hatch and live on the integuments under the skin, emerging in the spring. Where the egg is deposited a little tumor is formed, which is kept open until the grub or larva forces itself through the aperture during June or July of the following year. These tumors are called "warbles," and at first throw the animal into a wild agony, causing it to rush for water, if there is any attainable, regardless of driver, plow or vehicle. Animals dread these flies, and the appearance of a single one has been known to create a stampede in a herd. These grubs may be felt in the winter as hard lumps. The opening should be slightly enlarged with a lancet, and the grub squeezed out by pressure on each side. Then wash the wounds clean with a tincture of aloes and myrrh, and the abscesses will soon heal. The gadfly always selects the best-conditioned animal. The damage it does arises from the suffering it inflicts, and injury to the hide in case the animal be slaughtered.

Sheep Bot-fly. This genus of the gadfly lays its eggs in the nostrils of sheep, and the larvæ crowd into the cavities of the bones of the forehead, and in many cases produce death. It is composed of fine rings; is tiger-colored on the back and belly, sprinkled with spots and patches of brown, and has striped wings. It most commonly deposits its eggs in July, August and September. At this time the sheep collect in close clumps, with their heads inward, with their noses thrust close to the ground and into it, if any loose dirt or sand is within reach. During the ascent of the larvæ up the sinuses, the sheep stamps, tosses its head violently, and often dashes away from its companions over the field. The larvæ remain on the sinuses, feeding on the mucus secreted by the membrane, and apparently creating no further annoyance, until ready to assume their *pupa* form in the succeeding spring. They then crowd down the nose, creating even greater irritation and excitement than when they originally ascended, drop on the ground and rapidly burrow into it. In a few hours the skin of the larvæ has contracted, become of a dark brown color, and it has assumed the form of a chrysalis. This fly never eats. The male, after impregnating two or three females, dies, and the latter, having deposited their *ova* in the nostrils of the sheep, also soon perish. See Sheep.

Gaff or Gaffle, an artificial spur put on cocks when they are set to fight. Also, a large hook with handle for securing fish after having been brought to hand with a rod.

Gage, or Gauge, a measure or standard; also, to measure.

Gaggle, to make a noise like a goose; cackle. In hunters' parlance it means a large collection of wild geese, generally applied to those gathered on land.

Galipot (gal'i-pot), white resin from pine trees. When purified it is called "Burgundy pitch."

Gall (gaul), a bitter fluid secreted by the liver in a sac called the "gall-bladder;" an excrescence on plants, produced by insects (see Gall-fly); to fret and wear by friction, as to gall a horse's back; to harass and annoy, etc. Wind-galls are little tumors about the heels of horses over-driven. The proper treatment for galls on horses is to wash the galled places with a solution of sugar of lead, or to keep them clean with a plaster of common ointment, or dressing with simple cerate, and allowing no further pressure on the part until healed.

Gall-fly, a fly which punctures plants and produces galls. The innumerable and curious excrescences which are seen on the leaves, branches and roots of trees, are all the productions of different kinds of insects. Some of these excrescences have within a single cavity, in which several insects live together. Others have a number of small cells, with communications between them; others, again, have numerous distinct cavities. These productions are of various sizes, form and consistence, some being spongy, and others, like the gall-nut, extremely hard. All these apparently monstrous productions are occasioned by the puncture of insects when depositing their eggs. The ancient opinion concerning the animals found in these receptacles was, that they were spontaneously produced from the rotten wood. Afterwards it was believed that the roots of plants had the power of sucking up, with the sap, the eggs of insects, and that these were animated as soon as they arrived in a proper situation. There are a multitude of insects which form these excrescences, the principal of which is the Cynips. That which attacks the oak is of a burnished brown color, with black antennæ, and chestnut-brown legs and feet. The wings are white. It is small and hymenopterous. The excrescences are called gall-nuts. Like others of the genus, the female pierces a branch and deposits an egg in the interior, around which, in the course of a few days, the excrescence is thrown out, affording nourishment to the young insect, and protecting it from external injury until it has attained its full size, when, after having undergone metamorphosis, it penetrates the sides of the excrescence and comes out into open air. The oak, which bears the gall-nut of commerce, does not attain a greater height than four or five feet, and usually has very numerous, straggling branches. The leaves are oblong, sinuate, and smooth on both sides. The acorns are elongated, and sessile or subsessile. The galls are hard, woody and heavy, about the size of a marble, usually round, and studded with protuberances. Those which are gathered before the departure of the insect are most esteemed, and have a bluish color. The whitish are cheapest and are sometimes dyed blue, but the deception may be detected by the hole made by the insect in its exit. Gall-nuts are powerfully astringent and are frequently employed in medicine, as also in dyeing or making ink. An infusion is an excellent test of iron. They are imported from Smyrna, Tripoli and other places in the Levant, especially from Aleppo, to which place they are brought by the Koords from the western bank of the Tigris.

Gallon, the standard unit of wine measure, which contains 231 cubic inches. One gallon of pure water weighs nearly eight and one-half pounds avoirdupois; hence a pint weighs about a pound. The beer gallon, which contains 282 cubic inches, and formerly used in measuring beer, ale and milk, is now seldom used. The Imperial or British gallon contains 277.274 inches of distilled water at 62° Fahr.,—equal to ten pounds.

Gallinaceous Fowls. An order or very natural family of land birds, represented by the domestic cock and named from its scientific designation, Gallus. The gait of these birds is heavy; their power of flying is comparatively small; their bill is of moderate size, and has its upper mandible arched; their nostrils are partially covered by a soft and inflated scale; their toes, for the most part, are indented on the edges; their crop is very large, and their gizzard very powerful; their food in general is grain; and, with one exception, all lay and hatch their eggs on the ground, or on a slight carpeting of straw or grass. This order comprises the domestic cock, pheasant, the quail, the pigeon, turkey, peacock, guinea-fowl and some others of less importance or not so well known.

Gallop, the most rapid pace of the horse. It is sometimes, though improperly, regarded as included in the amble or canter, while the gallop and canter are entirely different paces, the former being a succession of short leaps, and the latter a movement of the front and hind legs successively. The transition from one to the other is so gradual that it would be difficult to exactly fix it. The style of riding in both paces is very much the same.

The gallop is of two kinds, the hand gallop and the full gallop. The hand gallop has an intermediate character between the amble and the full gallop; and though apparently simple in its progress is elaborate in its commencement. The horse simultaneously elevates his fore-quarters and throws forward his forelegs; but he raises the right limb a little higher, and carries the right shoulder a little further forward than the left, so as to make the action, not the leap, but a pace. During this first elevation, and in some instances preparatory to it, the right or off-hind foot moves slightly forward, but only sufficient to gain a true center, and to correspond with the increased forwardness of the right shoulder; the near hind-leg, it must be remembered, yet remains fixed. The fore extremities now reach the ground, the near fore a little before its fellow, the off fore doubling over it, and placing itself a little beyond it; and the slower is the gallop, the more considerable will be the distance between the placing of the fore-legs. As soon as the near fore-leg has met the ground, and before the off fore has yet taken its full bearing, the hinder legs are moved in the following manner: the near hind elevates itself; and, as it reaches the ground, the off hind passes it and becomes placed also. It is now that the horse begins to be "all in the air" in this pace; for on the next spring that the hind-quarters make, the fore-quarters being already elevated from the last impulse, the animal is of necessity completely detached from the ground.

The full gallop is a very simple affair, and consists merely in a succession of leaps. The fore-legs are thrown simultaneously forward, the hind-legs are quickly and almost simultaneously brought up; and the extension of all the limbs in the air during the interval between one bound and another, occupies vastly more time than the efforts of the leap. But the full gallop requires so different a center of gravity from walking, and demands so powerful and general a play of the muscles at its commencement, that it cannot be begun except through the medium of the hand gallop, and always presuppose the acquirement of a momentum of a progressive increase of speed.

Galloway, a breed of Scotch cattle, and also a breed of small horses. See Cattle and Horse.

Gallstone, a concretion formed in the gall-bladder. It causes great pain, especially while it is passing out. Scarcely anything can be done to relieve it, although it is believed that some system of dieting and hygienic regimen may prevent its formation.

Galoche (ga-losh′), an over-shoe; a gaiter made to cover the leg and upper part of the foot.

Gamboge (gam-booj′ or gam-boje′), a vegetable juice or gum resin, of several kinds, from the East Indies, used in paints and in medicines. It is of a reddish-yellow color, and taken internally it is a strong and harsh emetic and cathartic. Poisoning by it produces an acid and bitter taste, a choking sensation, dryness of the throat, retching, vomiting, purging, pains in the stomach and bowels, difficult breathing and death. As antidotes, give emetics of salt and water or mustard, followed by large draughts of warm milk or other bland fluids; foment the belly, and give strong coffee.

Gambrel, the hind leg of a horse; a stick crooked like a horse's leg, used by butchers in suspending slaughtered animals for the purpose of dressing or weighing. A "gambrel roof" is a hipped roof, a mansard or curb roof.

Game, wild animals which are hunted for food. To keep game fresh and sweet till it can be conveyed home from a distance or transported to market, clean it by wiping off the blood, cover the wounded parts with absorbent paper, wrap up the heads, and sprinkle ground coffee over and among the feathers and fur, as the case may be; pack up carefully, and the game will be preserved fresh and sweet in the most unfavorable weather. Game sent open and loose can not be treated in this manner, but all game packed in boxes or barrels may be deodorized as described. A teaspoonful of coffee is sufficient for a brace of birds.

Birds may be preserved in a fresh state for some time by removing the intestines, wiping the inside out quite dry with a towel, and then flouring them. A piece of blotting paper, on which one or two drops of creosote has been placed, is to be put inside the bodies, and a similarly prepared piece of paper tied around them. They should then be hung up in a cool, dry place, and they will be found to keep nicely for some time.

Game to be shipped to market should be packed in barrels or boxes, clean straw being the best packing material. In cool weather game is often shipped short distances openly, tied together in bunches. In freezing weather this is done largely and safely.

We may here give our epicurean friends a gentle hint on game-eating. In eating game those parts are the most tender and delicious which are exercised the least by the locomotive habits of the bird. For instance, in the woodcock and snipe the legs, which are merely used as their supporters, are juicy and tender, while their wings and breast (pectoral muscles) being abundantly exercised, are more tough, dry and strong.

When birds are tainted, pick and draw them as quickly as possible, and immerse them in new milk. Allow them to remain in it till next day, when they will be sweet and fit for cooking. Throw the milk away afterwards, as it is in an unfit state for any other use whatever.

ROAST WILD FOWLS. These fowls require a brisk fire, and should be roasted till they are a light brown, but not too much, otherwise they lose their flavor by letting the gravy run out. The flavor is best preserved without stuffing. Put pepper, salt and a piece of butter into each. Wild fowl require much less dressing than tame. A rich brown gravy should be sent in the dish; and when the breast is cut into slices, before taking off the bone, a squeeze of lemon, with pepper and salt, is a great improvement to the flavor. To take off the fleshy taste which wild fowl sometimes have, put an onion, salt, and hot water into the dripping-pan and baste them for the first ten minutes with this; then take away the pan and baste constantly with butter.

PRAIRIE CHICKENS. Skin the chickens, which makes them sweeter; cut them open on the back and through the breast; fry them in butter, with salt and pepper to the taste; cook them to a nice brown.

TO TRUSS WOODCOCK, SNIPES, etc. Pluck and wipe them very clean outside; truss them with the legs close to the body, and the feet pressing upon the thighs; skin the head and neck, and bring the beak around under the wing.

ROAST PIGEONS. When cleaned and ready for roasting, fill the bird with a stuffing of bread crumbs, a spoonful of butter, a little salt and nutmeg, and 3 oysters to each bird (some prefer chopped apple). They must be well basted with melted butter, and require 30 minutes careful cooking. In the autumn they are best, and should be full grown.

QUAILS ROASTED WITH HAM. After trussing and stuffing, cover with slices of ham, and cover all with a sheet of white paper; keep well basted with butter and water, and roast three-quarters of an hour with a good fire; remove the paper and brown quickly. The slices of meat and the paper must be fastened down with thread.

GAME PIE. This may be made of any of the birds named in the foregoing receipts. Prairie chicken and quails together make a delightful Christmas pie. Clean and wash the birds; cut the quails in half, the prairie chicken into 4 pieces; trim off bits of the inferior portions, necks, lower ribs, etc., and put them with the giblets into a saucepan, with 1½ pints of water, if your pie requires 6 birds; while this is stewing make a good puff-paste and line a large pudding-dish, reserving enough for a lid at least ½ an inch thick; when the livers are tender, take them out, leaving the gravy to stew in the covered saucepan; lard the breasts of the birds with tiny strips of salt pork, and mince a couple of slices of the same with the livers, a bunch of parsley, sweet marjoram and thyme, also chopped fine, the juice of a lemon, pepper, and a very small shallot; make a force-meat of this, with bread-crumbs moistened with warm milk; put some thin strips of cold corned (not smoked) ham in the bottom of the pie, next to the crust; lay upon these pieces of the bird, peppered and buttered, then a layer of the force-meat, and so on, until you are ready for the gravy; strain this, return to the fire, and season with pepper and a glass of wine; heat to a boil, pour into the pie, and cover with the upper crust, cutting a slit in the middle; ornament with pastry leaves, arranged in a wreath about the edge, and in the middle a pastry bird, with curled strips of pastry about it; these last should be baked separately and laid on when the pie is done, to cover the hole in the middle; bake 3 hours if your pie is large, covering with paper if it threatens to brown too fast.

Venison is prepared for the table like beef, veal or mutton, and rabbit and squirrel like fowls, domestic and wild. Game of all kinds is canned by various establishments in the West; and although such goods are not yet known to be adulterated, there is great danger of bad meat being put up occasionally, or of careless canning, as well as of poisoning from the solder of the cans.

To capture game, see Hunting, Guns and Gunning, and Birds, page 86.

Game Fowl, a species of the domestic fowl. See page 522.

Gammon, smoked ham; backgammon; humbug.

Gander, the male of the goose.

Gangrene, a putrefying state of an organ or part of a diseased animal. It is the same as mortification. It constitutes the last stage of the most violent kind of local inflammation It arises from the rupture of the local blood-vessels by the congestive action of the inflammation, and consists in the decomposition of the effused blood and the ruptured tissues. The discharge from a gangrenous organ is dark-colored and has a peculiar and very offensive smell. The attendant symptoms indicate sinking, debility, and excessive danger. Gangrene in an important organ is incurable, but external gangrene, arising from a wound or a contusion, may in the case of a horse be successfully scarified, fomented and dressed with digestive liniment, oil of turpentine, or camphorated spirit of wine.

Gape (gap), to open the mouth wide; to yawn; to open as a gap. Gaping, except in some diseased conditions, is indicative of a want of the usual amount of exercise. As to "gapes" in chickens, see Fowl, page 538.

Garden, a piece of ground laid out for the cultivation of fruits, flowers and kitchen vegetables. Fruit-garden is where the small fruits and dwarf-trees are cultivated. A vegetable garden is where the various kitchen vegetables are grown. Although the term is now generally understood to mean either of these,—fruit, flower, or vegetable garden—yet it may be properly applied to other uses, as landscape garden, herb garden, etc.

The situation of the garden with respect to the residence will be found discussed in Landscape Gardening. The various vegetables and fruits of the garden are treated under their respective heads, and in Vegetable Garden, while the flowers may be found in Floriculture.

Garden, Vegetable. This is that very interesting branch of agriculture where kitchen vegetables are cultivated. There are many considerations of importance to be weighed in selecting the location of the garden. The shelter, water, soil, etc., all have an important bearing upon this point, and he who would ignore them will certainly fail of realizing ordinary success as a gardener, or have the pleasure of gathering abundance of excellent fruit or vegetables.

Shelter is, in our climate, a primary consideration. This may in part be derived from the natural shape and situation of the ground. Gentle declivities, as the base of the south or southwest side of hills, or the sloping banks of winding rivers, with a similar exposure, are therefore very desirable. It is a rule that there should be no tall trees on the south side of the garden, to a very considerable distance; for during winter and early spring they fling their lengthened shadows into the garden at a time when every sunbeam is valuable. On the east, also, they should be sufficiently removed to admit the early morning rays. The advantage of this is conspicuous in the spring months, when hoar-frost often rests on the tender buds and flowers; if this be gradually dissolved no harm ensues, but if the blossom be all at once exposed to the powerful rays of the advancing sun when he overtops the trees, the sudden transition from cold to heat often proves destructive. On the west, and particularly on the north, trees may approach nearer and be more crowded, as from these directions the most violent and coldest winds assail us.

The best general exposure for a garden must evidently be toward the south; and a gentle declivity in that direction, equal perhaps to one foot in 30, is deemed very desirable, effectual draining being in this case easily accomplished.

In selecting ground for a garden the plants growing naturally on the surface should be noted, as from these a pretty correct opinion may be formed of the quality of the soil. The subsoil should also be examined. If this be radically bad, such as an iron-till mixed with gravel, no draining, trenching or manuring will ever prove an effectual remedy; if, on the other hand, the subsoil be tolerably good, the surface may be greatly meliorated by these means. In every garden, two varieties of soil are wanted, a strong and a light one, or in other words, a clayey loam and a sandy loam, different plants requiring these respective kinds. For the general soil, a loam of middling quality, but partaking rather of the sandy than the clayey, is accounted the best.

The improvement of the soil naturally becomes an object of great importance at the first formation of a garden; and its subsequent management, or "keeping in heart," as gardeners term it, is a matter of equal interest. A mixture of clay and sand is called loam, and according as the one or other of these earths predominates, the soil is denominated a clayey or sandy loam. When oxide of iron prevails, and renders the clay hard and of a dark brown or red color, the soil is called ferruginous loam, or more commonly till. Boggy or heathy soil consists of ligneous particles, or the decayed roots, stems and leaves of various carices, heaths and sphagnums, and the coaly matter derived from these, generally with a slight mixture of argillaceous earth and sand.

The soil of a garden should never be less than two feet and a half deep; the best gardeners prefer having it fully three feet. The natural soil therefore, however good, is seldom of sufficient depth. If it be not two feet, a quantity of earth from the field is carried in. The cleanings of roads and grass-turf of any kind form valuable additions to garden soil. In the course of trenching, a portion of the subsoil is brought to the surface, and gradually meliorated, but to bring up much of it at once is very injurious. Soil of the usual depth may be trenched two spadefuls deep; and if this be done every third year, it is evident that the surface which has produced three crops will rest for the next three years, thus giving a much better chance of constantly producing healthy and luxuriant crops, and with one half the manure that would otherwise be requisite.

It is agreed on all hands that nothing contributes more to the preserving of the soil of a garden in good condition than exposing it as often as possible to the action of the sun and air. It is a rule, therefore, that garden ground, when not in crop, should regularly be dug rough, or if possible ridged up, and left in that state to the influence of the atmosphere. If it be allowed both a winter and a summer fallow, the oftener a new surface is exposed the better; after it has lain ridged up during winter, therefore, repeated diggings are given in the spring and summer months. Whether some noxious matter be exhaled, or some fertilizing substance be imbibed, or what may be the precise nature of the operation that goes on, we do not here inquire. The fact is certain, that aeration, as it is sometimes called, is of the greatest advantage to garden soils. A common reason why farmers of moderate means have not had better kitchen gardens is that they have not learned how to cultivate them at little expense. Going through once a week, to keep the crops clean, and in the best growing condition, could not be performed by hand. Many are imitating the practice of the large market gardens, and do the work by horse labor, and with the drill, plow and cultivator. There are a few crops that need planting in beds, and a small portion of the garden may be devoted to these. All the rest may be arranged for horse work. The great advantage here is that no care or skill is required in laying out. All that is needed is a turning ground at each end, 12 feet wide, for the horse. This may be a smooth grass walk. Rows of currant, gooseberry and raspberry bushes and dwarf fruit trees may occasionally extend across the garden parallel with the rows of vegetables. After the plants have a fair stand the horse will do nearly all, and the garden may be kept cleaner than ever before at a tenth of the cost. By passing once a week, and keeping the ground constantly mellow the crops will make a fine growth.

To have a deep, rich, sandy loam on a slope toward the south or the east, protected from the violent winds of the southwest, with good under drainage, seems to describe in general terms about all the essentials of a good situation for a vegetable garden. When one cannot have such a situation exactly, the nearer he can come to it the better. The two greatest faults in this respect in the West are flat, undrained ground and a poor, washed-out hillside. Valley lands are so low that frosts are apt to injure the crops. On the north and west sides it is well to have a high board fence or a very high hedge and a curtain of trees outside. As to walks and ornamental arrangements, see Landscape Gardening: see also Drainage. As to plowing, digging and subsequent cultivation, of course it is very important that it be all done when the ground is comparatively dry and perfectly friable. Ridging on an extensive scale is done by back furrowing with the plow; sub-soil plowing is done by one plow, longer geared, following another, geared short; trench plowing is done by having the second plow with a longer mold-board, to throw the earth up high; spading is generally done by taking two thick slices; the spade-slice should not be thicker than half its length.

A good appendage to a garden is a small garden house, in which to keep garden pots, compost for choice plants, tools when not in use, to do indoor work during rain, etc., etc.

A pit is a sunken frame-work covered with glass, protected by shutters or mats, for wintering half hardy and tender plants, and for blooming roses and other flowers earlier and later in the season than would be practicable in the open ground. It may be partially filled with leaves from the woods, sawdust, sand or spent manure well pulverized. It should have light, and a little air admitted about noon of every bright winter day that is not very cold. Keep mice and insects out of it. It may be divided into compartments, to suit different plants.

A garden frame is a movable box having glass for the upper side like a hot-bed and can be set over a hot-bed or elsewhere as occasion requires; in the latter case it is a cold bed, and may be in the sunshine or in the shade. For the construction and use of the Hot-bed and Cold Frame see articles on those subjects.

For the collection of kitchen slops, etc., to make liquid manure, a hogshead pitched on both sides and sunk into the ground is the best thing; it is called a tank. A tight cover should be kept upon it.

A hillside garden can scarcely be made too rich by over-manuring; and a yellow clay or very sandy soil can receive to advantage a mixture of all kinds of manure, as decaying animal matter, guano, poudrette, stable manure, green crops or rowen, swamp muck, leaf mold, plaster, lime, ashes, kitchen slops, and the fertilizers, as salt, phosphites, etc., etc. A cold clay soil, such as characterize our flat Western prairies, need sand and the fertilizers. It being composed of burnt grass, which has been accumulating for ages, it serves as a basis for corn, wheat, hay, and other plants of the grass order, rather than for root crops and fine garden vegetables. Salt is especially recommended for the soil, as it is so effectual in destroying insects.

In the selection of varieties, the following principles are of some value: The globular form for cabbage heads and the turnips are better than other forms; the egg form is an improvement upon the heart-shaped in roots that have not yet been brought to better forms; in rutabaga, the obtuse egg form is considered the best; of cabbage, the heart-shaped for early and the cheese form or globular, for winter cabbages, and of lettuce the screw and the globe form are regarded as the best; carrots should be of an orange color instead of light lemon; beets should not be streaked with white; and yellow turnips are richer and sweeter, other things being equal, than white. As in general farming, rotation of crops should be observed, except that onions do better continued on the same ground. Some crops are so favorable to the growth of weeds that if continued long upon the same ground the labor of cultivation is much increased. Crops planted continually in the same soil are more subject to the ravages of insects peculiar to the crop planted. Different plants derive their principal nourishment from different depths of soil. Deep-rooted plants, as beets, carrots, parsnips, etc., should be followed by the shallow-rooted—onions, lettuce, cabbage, etc.

In the saving of garden seeds for next year's planting, it is best to select those of the middle part of the cropping season; those which are earliest matured tend to bring forth earlier fruit, but smaller, while those latest matured tend to produce later and deteriorated crops. Hence, we are apt to let our stock of beans and peas degenerate by saving for seed only those latest ripened. Some of the products of planting improper seeds are supposed to be new varieties, but they are debased, or in some way undesirable; as, for example, "early peas," which are late and unprolific, or "six-weeks beans," that in sixteen weeks may possibly ripen a scanty and scattering crop. Likewise the biennial vegetables, as the turnip, cabbage, beet and carrot are made sometimes to go to seed the first season, and thus a tendency in the wrong direction is established. The climate also has an influence to deteriorate those plants not natural to it; for example, heavy oats cannot be long raised in a hot, dry climate; cabbages become leathery and worthless; radishes mere sticks, etc. If lettuce seed is sown too late in the spring the heat of summer will prevent its heading finely.

It is more important to obtain seeds of good stock than seeds that are certain to grow. There is also some risk in depending upon seeds raised in private or market gardens from which vegetables are gathered for use or sale; so that it is best to obtain them from seedsmen of reliable character.

To prevent deterioration in the garden, vegetables of different varieties of the same species should be planted at a distance from each other, else they will mix, as cucumbers, melons, pumpkins, squashes, corn, etc. See Varieties, Fertilization and Fertilizers.

In sowing very fine seed, it is better to mix it with sand or ashes so that it can be scattered more evenly over the ground; a tablespoonful of cabbage seed, for example, might be mixed in a half bushel or peck of sand or ashes. The time of sowing and planting varies according to the nature of the vegetable and the period at which it is desired to bring forward the crop for use; for example, we want early peas and later, and there should therefore be several sowings of them. Those vegetable crops intended for winter feeding to cattle, and those of the same kind intended for the table, should not be sown at the same time, a large crop being the main object in raising the former, and excellence chiefly desirable in the latter. All crops for winter use should be sown late enough to avoid the summer heat upon the half matured crop; those intended for feeding to cattle as early as possible, consistently with indispensable rules; while those for table use should be deferred to as late a period as may in any way consist with the probability of their maturing before winter.

Whenever root vegetables, having attained one-fourth to one-half or more of their ordinary growth, experience a check from any cause, it is almost impossible to start them anew so as to obtain either handsome or well-tasted roots; they will in general be either hollow or stringy and necked, or have an alkaline taste, or all of these may combine to render them worthless for the table and of but little value for any purpose. Even if the check occur while they are quite small they are scarcely ever recoverable.

It is therefore necessary so to time the sowing the winter root crops as to carry them clear of the summer heat well into the autumn, that they may just attain their growth before freezing weather sets in. In a well cultivated garden it is generally safe to allow about 12 weeks for the growth of winter vegetables, counting from the time that their third leaves are about an inch long; though turnips, or bush beans for salting, will be ready for use in a shorter time.

As to the depth of sowing, the best general rule is just deep enough to be in constant moisture, and the nearer the surface this is, the better. Small seeds must always go on the surface and merely raked in lightly. In dry, hot summer weather it is needful to plant deeper than in early spring.

As to transplanting, of course one can raise a little larger and better plants if he sows the seed in the first place where he wishes the vegetables to grow to maturity; but this method is altogether too tedious where transplanting will do nearly as well. The taprooted plants, as beets, parsnips, carrots, etc., cannot bear transplanting well, and it is therefore needful to sow them thick in their final place and afterward thin them out; but the fibrous-rooted plants, as cabbage, tomatoes, sweet potatoes, etc., bear transplanting so well that we can take advantage of the fact and economize both time and labor by starting them in beds and transplanting them to the open ground at the proper time.

The final transplanting should leave the plant a little deeper in the ground than it was in the seed-bed. To put out the plants rapidly and well, it is advised to use the dibber. Holding several plants in the left hand, with the right hand make a hole of the proper depth with the dibber, set a plant in, and then with the dibber strike down about two inches away, and directing underneath the plant as if to take it up, bring the dibber into a perpendicular position in such a manner as to crowd the earth up to the plant, from the bottom up. After little practice one will be able to set out five to ten plants to the minute. Water the plants as they are set out. Then watch for cutworms and other insects, and hoe within two or three days after setting the plants out, to keep up a good circulation in the surface of the ground.

Ridging is often remunerative, especially in wet grounds, or in ordinary good ground during wet seasons, if only, in the latter case, a dry enough time can be improved before the wet weather sets in. Where land is valuable and time cheap, one can do many things that would not otherwise pay; and deep ridging is one of these things. What we mean by deep ridging, is a ridge of earth that is made loose and mellow down to a considerable depth. Many ridges are carelessly made by drawing loose earth up over a ridge of unbroken ground. For large plantings level cultivation is best. Hilling is about the same as ridging so far as the plant is concerned, with these few small advantages: more thorough tillage is given, more new earth brought to the roo ts, and in case of pole beans, one pole will serve for several vines. With most vegetables the hill should be flat and low, with the earth a little higher a few inches distant from the plants, as if to guide the rain-water toward the plant.

By a little ingenuity two crops in one season can be raised on the same ground, sometimes together, as corn and pumpkins, or potatoes with corn in alternating rows, or winter crops of turnips, cabbage, radishes, celery, etc., on ground which in the first part of the season was occupied by early peas, beans, radishes, greens, etc. Beets, carrots and parsnips can be alternated with onions, and vegetables of many kinds can be raised between the rows of small fruit, etc. But in general the crops will be somewhat smaller than the average unless the ground is of extraordinary richness and well managed.

Bedding of plants is the first transplanting, when the young shoots are set only two or three inches apart, or at such distances as will prevent their being drawn up and weakened by crowding one another, as well as to afford them room to form good roots. Then, when the time for final transplanting arrives, they will have a mass of small fibrous roots which will hold together a quantity of earth,—a great advantage in their favor.

Potting is a second removal of the plant before setting it in the open ground. This process is followed especially with the egg-plant, the tomato, etc. After they have grown in the pot until the earth in it is about full of their roots, they are taken from it by carefully turning the pot upside down with one hand, catching the earth with the other hand, with the plant extending between the fingers.

Grouting is the drawing of the roots of plants, from which the earth has fallen, through soft, thin mud, made by mixing good, rich soil with water, to which cow dung may be added.

Hoe often and deep, is the motto of the successful gardener; but refrain from watering, except in extreme cases where it is necessary to keep the plants alive. Instead of watering a little and often, water only in extreme cases of dry weather, and then give a thorough soaking every week or ten days, in the evening, with rain or pond water.

Plant lice are more apt to attack sickly or poorly cultivated vegetables; hence a cultivation that keeps the vegetable a strong grower is one of the best preventives. Showering with tobacco water, or strong brine, or sowing dry ashes or slaked lime or plaster is still recommended as effectual in many instances.

The striped cucumber bug, the jumping beetle and the turnip bug cannot be certainly exterminated by any proposed remedy, but only temporarily disturbed by the lime, ashes, dust, sulphur, soot, snuff and sand so often recommended. Vigorous cultivation of the vegetable is the only, at least the best, preventive.

The pea bug or weevil is avoided to some extent by selecting those varieties of the pea which it does not greatly infest. Scalding the peas slightly just before planting, or soaking them until they sprout, or planting only two-year-old peas, keeping them in tight barrels and sifting out and destroying the weevils in the spring or summer of the first season, are methods for destroying the pea bug.

The squash bug has to be caught by hand in the cool of the morning and killed.

The cucumber borer has to be disposed of by destroying him and the vine altogether, by scalding or burning.

The cut-worm must be hunted up individually early in the day, by his usual signs of a cut leaf and wilted plant, and dug out and killed.

The hop worm should be treated to an occasional shower bath of soap-suds or solution of whale-oil soap.

The root worms of the turnip, radish and onion are to be destroyed by scalding or burning of the diseased plant. Preventive: timely sowing and good culture.

Moles and a few insects not mentioned above sometimes do a little harm to western gardens, but so little it is scarcely worth while to combat them.

As to further details in the art of vegetable gardening, see the articles on the respective plants in their alphabetical order in this volume. See also Floriculture, Landscape Gardening, Transplanting, etc.

Garden Seeds. In the raising of garden seeds, the most important item to look after is the stock. Not only the best variety, but even the best strain and the best developed in each should be selected. The next thing is to keep allied species and varieties so far apart in the field that they cannot mix. Especial care must be taken with vines, as pumpkins, squashes, melons and cucumbers seem to surpass all other vegetables in mixing, and a very little mixture of pumpkin spoils a melon. Cabbages, turnips and radishes will cross to some extent and become deteriorated; so will the different varieties of corn, carrot, onions, celery, lettuce and potatoes. Bush beans, peas, parsnips and tomatoes are not very susceptible to mixture. A high, tight fence between two varieties is a pretty good protection against crossing, but it is safer to have allied varieties a quarter or a half mile apart.

The vitality of seeds prepared for keeping is more frequently injured by excessive drying than by any of the ordinary accidents to which they are liable. All dealers in seeds, especially grass seeds, have to complain of this. When damp they will not keep, and are generally put on the top of a kiln to dry off the external moisture; but if the process be suffered to go beyond this, and the natural moisture of the seed is much trenched on, it will be as white and fine and full of farina as before, but it will not grow. Onion and other seed kept over the year loose in drawers or in paper parcels will not vegetate. When kept in this way, even for a few weeks, onion seeds have been known to lose in weight more than an ounce in the pound. Most gardeners have noticed that after a long continuance of hot, dry weather the best of seed will either not germinate at all or will do so very weakly. These facts prove that seeds are much injured by the drying action of the air; and when set aside for preservation in our cool climate, they should be excluded from the air as much as possible, and not exposed in vessels pierced with holes for the admission of air, as is commonly done.

In the selection of seed from year to year, the earlier and better developed are the best, as such a choice tends in a general way to improve the stock. We must give a short notice of each vegetable in detail.

BEAN. Seek a thrifty crop, and in no case save as seed the scattered pods left from a crop used for the table. Sort over and pick out all imperfect seed.

BEET. Set out early in spring, in deep, rich soil, and as it commences to grow, break off all seed stalks but the main one from the center of the crown. The seed does not ripen evenly, but when the earliest are ripe the stalk may be cut, and after curing a few days all is ready to thresh, which is very rapidly done with a flail. Beet seed in this climate is liable to blast in unfavorable seasons, and since sound seed will remain good for several years, careful gardeners keep a two-years' supply on hand. Don't store it away till it is thoroughly cured and dried.

CABBAGE. Select large, hard heads on short stumps, with few loose leaves, and these should be kept over winter with special care, free from frost. As soon as the seed-pods turn purple, cut, and cure by spreading it thinly over a tight floor or cloth; when thoroughly cured thresh out and clean.

CAULIFLOWER seed is too difficult to raise in this country.

CARROT. Treat the same as beets, except that, as the seeds ripen unevenly, the heads must be cut from time to time as they ripen.

CELERY. Same as carrot.

CORN, SWEET. When the milk of the kernel begins to thicken, pick the best ears, braid together by their husks, and hang up in a good place to dry. Do not shell until it is wanted for use.

CUCUMBER. Unless mere earliness in the character is sought for, pick off during the growing season all imperfect fruit, so as to throw all the strength of the vine into the few favored specimens saved for seed. When the latter are dead ripe, but not quite soft, take out the seed with the pulp, let it stand three days, and wash them by stirring them in cold water and pouring the water from one vessel into another; thus the imperfect, or lighter, seeds will be poured off with the pulp. With the use of very clean, white sand the seeds may be washed immediately, without the three days' fermentation. Let the seeds in either case remain spread out until dry as a bone, and then put up in paper packages.

EGG PLANT. Peel and slice the fruit, squeeze the seed from each piece into a tub of water, and then pour from one vessel into another, as with cucumbers, never allowing them to ferment. Dry them rapidly or they will sprout.

LETTUCE. Select seed from plants which remain longest without running to seed. When ripe enough to shell out, cut, gather upon stout sheets, and thresh with a flail, and winnow by the wind or a fan.

MELON. About the same as cucumber seed, only they need to stand but 24 to 36 hours.

ONION. In cultivation, hill up the stalks as high as the bulb, which not only preserves moisture in time of drouth, but also supports the stalk under the weight of a heavy seed-head. When a few of the seed vessels of any head begin to crack open, it should be cut with a few inches of the stalk and spread in an airy place, not more than four inches deep, and stirred several times a day. Or they might be spread upon lattice-work, and elevated a little, so that the air can circulate freely underneath. In three or four weeks, when thoroughly cured, it can be stored away until convenient to thresh and clean, which is easily done with flail and fan. When the fan does not clean perfectly, sink the seed in water, pour off the chaff with the water, and dry thoroughly the good clean seed which sinks to the bottom.

PARSNIP. Same as beets.

PEAS. These are always buggy in this climate if sown early, and if sown late they are inferior in quality; hence we get our seed from Canada.

RADISH. Plant early, so the seed may ripen during the heat of summer; cull out the sprouts and mongrels; when the seed-pods are thoroughly ripe and dry, cut and thresh out, and after a little more drying, they are ready to put up. It is best to have seeds from radishes which have been for generations American grown and acclimated.

SQUASH. Summer squash may be treated the same as cucumbers, but winter varieties are better kept stored until mid-winter.

SPINACH. Same as lettuce.

TOMATO. Start the plants early, in a hot-bed, with room enough to be stocky, transplant at least twice before removing to the field, select for seed the earliest and best, and then treat as cucumbers. Only they need to ferment but one day.

TURNIP. Store the roots as beets and save the seed as of cabbages. American seed is better than English.

Gardener, a person who performs the routine of work or has the professional management of a garden or of any piece of garden scenery. Gardeners are as different in their qualifications as farmers. A gardener, at one extreme of his profession, may be little more than a spadesman or a day-laborer, and at the other he may be a designer of parks, boulevards, landscapes around State or National buildings, —indeed, a professional artisan of high distinction. One grand attraction of this business is that, while honorable, delightful, and eminently favorable to the highest order of intellectual enjoyments, it may be followed by those of the most limited means. Literary men, philosophers and nearly all truly great men would rather pass their leisure hours working a garden than at anything else.

Garget, a disease in the udders of cows, arising from an inflammation of the lymphatic glands; a disease in hogs, indicated by staggering and loss of appetite; a name of the poke-weed.

Gargil, a distemper in geese, which affects the head and often proves fatal.

Gargle, to wash or rinse, as the mouth or throat, particularly the latter, while the liquid is prevented by an expulsion of the breath from descending the throat; also the liquid itself.

An excellent gargle for sore mouth and throat can be made of sage and privet leaves, 1 handful of each, about half as much golden-seal root and bark of sumac root; boil in 3 or 4 pints of water down to 1 pint, strain, and add 1 tablespoonful of powdered alum and about ½ a teacupful of honey. This is an excellent gargle for ulcerated sore throat, sore mouth, and salivation from mercury. An excellent gargle is made by dissolving chlorate of potash in water; or take some of the crystals in the mouth and let them dissolve.

Garlic, a plant of the onion family. It has been cultivated in Europe since the year 1551, but is very moderately used in this country. The leaves are grass-like, and differ from those of the common onion in not being fistulous. The stem is about two feet high, terminated by a head composed principally of bulbs instead of flowers; the flowers are white, and furnished with tricuspidate stamens; the root is a compound bulb, consisting of several smaller bulbs, commonly denominated cloves, enveloped by a common membrane. Garlic has a strong, penetrating odor and pungent acrid taste. It differs from the onion only by being more powerful in its effects. In warm climates, where garlic is produced with considerable less acrimony than in cold ones, it is much used, both as a seasoning and as a food. When bruised and applied to the skin, it causes inflammation and raises blisters. In the south of Europe, particularly in Spain, it is very much used, entering into the composition of almost every dish, not only among the common people, but among the higher classes of society, and it is everywhere prized by epicures. At all times, however, it has experienced much contrariety of opinion, and has been adored by some nations and detested by others, as by the ancient Greeks. Its cultivation is easy, being a hardy plant, growing in almost every kind of soil, and it is produced by planting the radical or floral bulbs. Plant the bulbs in rich soil, in rows or in ridges fourteen inches apart, and six inches apart in the rows.

Its medicinal virtues have also been much celebrated. It not only forms an excellent expectorant, but has been administered in a great variety of diseases, as hysteria, dropsy, croup, worms, nervous and spasmodic coughs, cutaneous eruptions, obstructions, etc. It may be given in the form of syrup, tincture, or in substance, but the best way to use it when fresh, is to express the juice and to mix it with syrup or other proper substances. The juice of garlic mixed with sweet oil, or stewed in sweet oil and then strained and squeezed out, is one of the very best remedies for deafness, as well as for ear-ache. In cases of the latter a little laudanum should be added. A few drops upon a warm teaspoon, and dropped into the ear, is the way it is used. The ear should then be stopped with cotton. In cases of severe spasmodic croup, a poultice of garlic, or garlic and onions, prepared by first roasting them, will always give immediate relief, if not effect a cure. A little lobelia (tincture or powder) mixed with the garlic poultice will make it more efficacious. The poultice should be applied warm on the throat or upper part of the chest.

The juice of garlic is a strong cement for broken glass or china. Snails, worms and the grubs or larvæ of insects, as well as moles and other vermin, may all be driven away by placing preparations of garlic in or near their haunts. The virtues of garlic are most perfectly and readily extracted by spirit of wine.

Garnish, to decorate. In cookery many dishes, especially of meats, are garnished with salads, as celery, parsley, lettuce, onion, horse-radish, peppers, pepper-grass or cress, mustard, etc.

Gas. Sometimes persons from the country, retiring for the night at hotels or residences in a town or city, blow out the gas flame instead of turning it off by a little faucet, always fixed near by for the purpose, and endanger their lives. Many persons have thus smothered themselves to death by such a mistake. If the faucet is not tightly closed, the gas continues to flow out into the room unburnt, and in an hour or two smother all life that may be present. A hint to the wise is sufficient.

Gasoline (gas′o-leen), a most volatile form of kerosene and correspondingly more dangerous to handle near a flame. For light and heat it is superior to kerosene.

Gastric, pertaining to the stomach. Gastric juice is the fluid poured out by the stomach into the food which is present, to aid in digestion. Pepsin is its chief element. Dys-*peps*-ia literally signifies a lack of action of the pepsin. Gastric fever, or gastritis, is inflammation of the stomach. The gastric juice does not act indiscriminately on all substances, nor is it the same in all animals, nor does it continue always of the same nature, even in the same animal, changing according to circumstances. It acts with a chemical energy in dissolving food, attacking the surface of bodies and uniting to the particles of them. It operates with more energy and rapidity the more the food is divided, and its action is increased by a warm temperature. The food is not merely reduced to very minute parts; its taste and smell are quite changed; its sensible properties are destroyed, and it acquires new and very different ones. This fluid does not act as a ferment; it is a powerful antiseptic, and even restores flesh already putrified.

Gastritis, inflammation of the stomach. Gastritis, however, does not include the effects of mechanical distension of the stomach, or the irritating action of poisons, acrid substances, or improper food, but is simply idiopathic inflammation of the stomach's mucous surface. This disease sometimes occurs in the horse, yet is generally so combined with enteritis and so closely similar to that disease in symptom, as to be very difficult of detection. A horse attacked with it loathes his food, is extremely restless, evinces great distress, lies down and suddenly rises, has fits of cold perspiration, and seems to suffer prolonged pain after swallowing any food; and he must, in all outward respects, be treated in the same manner as for enteritis, but must receive no internal remedies except such as are eminently sedative.

Gate. A gate has the same relation to a field or other enclosure which a door has to a house; and ought to combine the properties of a good fence with strength, durability, convenience of situation, and the utmost facility of opening and shutting.

Many gates are either so slight as to be easily overleaped, broken through or thrown down; many are so ill-hung and ill-latched that some horses and horned cattle can successfully assail or even readily open them; many are so ill-constructed or feebly poised that they soon decay, or become rickety, or cease to be easily opened and shut; and many are so inconvenient or otherwise so exceedingly faulty as to accomplish very imperfectly, or scarcely at all, the designs of their erection. Nearly all farmers have been more or less plagued with bad gates, and are aware how grievously they occasion injury to land and crops from the trespass of cattle; and they must therefore be glad to know that perfectly good gates differ from abominably bad ones far less in the costliness of either their materials or their workmanship than in the mere skill with which they are constructed.

A gate which is little used, or is commonly kept locked, or cannot conveniently be held open when wanted, may be hung upon hooks or pivots perpendicular to each other, so that it may stand at rest on any line whatever; but a gate which is merely latched and which serves as a part of a fence of a grass-field or a cropped enclosure, ought to be hung on hooks or pivots which give it one determinate line of rest in the direction of the latch, so that, whenever it is opened, it may have a self-shutting action. The carelessness of farm-hands and others, who would rather leave a gate open than take the slight trouble of shutting it, admits of no efficient corrective except to give the gate the power of shutting itself; and any disadvantages which might occasionally result from that power can easily be counteracted by means of either a temporary prop-stone or of a permanently sunk stone with a simple hook or latch on its summit.

Gate-posts ought to be so firmly set in the ground as to resist all tendency to decline from their perfectly upright position. The constant weight of the gate tends to pull the hanging-post inward; the fall of the gate and its frequent infliction of blows in shutting, tend to drive the falling-post outward; and the passing of heavily laden wagons or other wheeled vehicles near the posts tends to disturb the foundation of both posts. A slope of the ground adjacent to the gate-posts, whether the slope be natural or artificial, tends to make them nod in the direction of the slope.

so that the posts of a gate across the ridge or summit of a hill are liable to decline outward, the posts of a gate across the bottom of a hollow are liable to decline inward, and the posts of a gate across a terrace-road upon the face of a declivity are liable to decline, the one outward and the other inward, both stooping in the direction of the declivity. The opposite effects of scorching heat and intense cold, of excessive rain and extreme drouth, aided by the shaking action of vehicles passing along the road, also sink the ground around the settlings, and tend to work the posts toward the natural descent of the surface. These changes from the original position of the post causes the gate to sag. The first object therefore, in constructing a good gate, is to prevent as far as possible its sagging, either by setting in at the bottom a brace from the hinge post to the latch post, which should be at least five feet in the ground, and another within a few inches of the surface of the ground, or by setting the hinge post deep and solid, letting it run eight or ten feet high—the higher the better—and then bracing it backward with a common fence wire, doubled, so that it can be tightened by twisting. One end of the wire is fastened to the top of the hinge post and the other to the bottom of a fence post, or a post set for the purpose, about 20 feet away. The size and style of a gate should depend on the purpose for which it is designed. Most farm gates, however, should be wide enough to admit loads of hay and grain, and for this purpose 12 feet is not too wide, and it will also permit the passage of the wide harvesters now becoming so common.

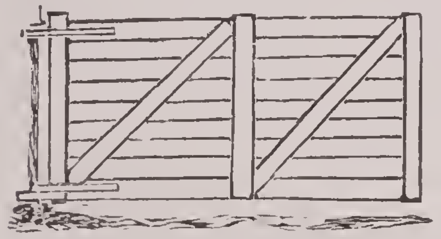
FIG. 1.—*Improperly Braced.*

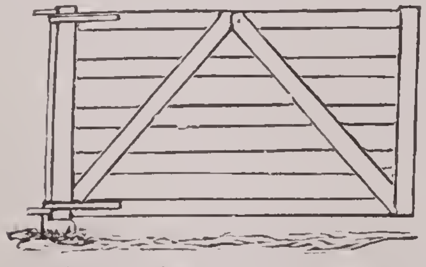
FIG. 2.—*Improperly Braced.*

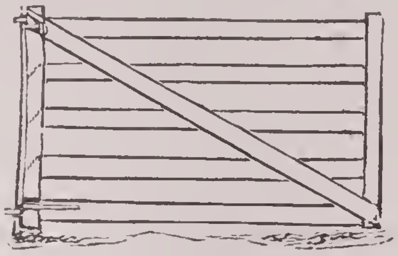
FIG. 3.—*Improperly Braced.*

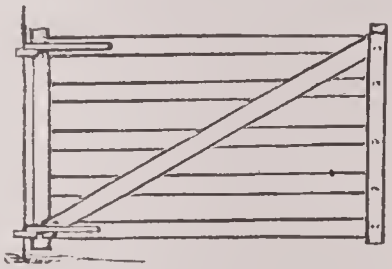
FIG. 4.—*Properly Braced.*

It is not uncommon for farmers in making large gates to brace them improperly. One frequently sees gates braced as shown by Figure 1. Neither is it uncommon to find them braced as in Fig. 2, and occasionally one may be seen braced as shown by Fig. 3. Now, it may readily be seen that the full power of the brace, as intended, is not obtained. Gates thus constructed will be found sagging in a short time. Nor can they ever be patched up so they will not sag. The proper way to brace a gate of these forms is as shown in Fig. 4. By these illustrations it may readily be seen how a gate should be braced. The cuts themselves, though simple, will forcibly illustrate the right and wrong way to brace a gate. A gate communicating between a field and a public road ought to be comparatively high. Such a gate may properly enough be made double, in the manner of folding doors, and may have its suspension hooks placed exactly perpendicular to each other, so as to make either part of the double gate remain at rest in any one line whatever of the great arc it describes in opening. A gate of communication between field and field is preferred by some persons to be light and high, and by others to be low and heavy; and it is recommended by many to be about 4½ feet high, in order that it may serve as a good fence against horses, having its top rail as high as their wind-pipe, and allowing them to put their head over it, and not provoking them to push or force it with either their breast or their rump. When wood is used for posts, any coarse kind, whether soft or hard wood, which is unfit for other useful purposes, may in most instances be sufficiently good. When stone is used, a single pillar-piece of granite, compact greenstone, or any other hard crystalline rock is best, and if the gate be hung on the front of it, the bands of the hinges, instead of being indented into the stone, ought to be carried through to the opposite side, and there fixed by a bolt or a screw nut. When timber is used for the gate itself, spruce is unsuitable on account of its great liability to break; larch is unsuitable on account of its powerful tendency to warp, and if some kind of soft and cheap wood must be employed, the least objectionable is cedar, but the best, in all respects, is Western catalpa and white oak, not too tough and entirely free from sap. All the mortises of the gate, and the parts at which the uprights and diagonals cross the bars, ought to be carefully coated with white lead; and when the parts of the gate are joined together, the whole ought afterwards to receive two coats of paint.

A strong farm gate may be made by taking two pieces of 3x4 scantling 5 feet 6 inches in length, for ends, five boards 1x6 inches, 12 feet long, for bars, and a hard-wood piece 2x4 inches, 12 feet long, for a top bar, and a 16-foot fence board to cut for a brace. Mortise the bars into the end pieces, and fasten with pins or bolts, putting the hard-wood bar on top with the edges, or 2-inch surfaces outward, to give strength; put the brace diagonally across the gate, from the bottom at the hinge, or back end of the gate, to the top, at the front, cutting it to fit against the ends, and under the top bar, and fastening to the other bars with bolts. The gate will be strengthened by bolting a 1x6 board square across the center. In "laying out" the gate, mark for the bottom board, leave a 4-inch space, mark for the second, a 5-inch space, mark for third, a 6-inch space, for fourth, a 7-inch space, for fifth and an 8-inch space for the top bar. Hang the gate well, with strong hinges, let the top one go through the post, and fasten it with a nut.

Fig. 5 represents a gate which is opened and closed by running a wheel of the vehicle in which one is riding against a double-crank bar just above ground, one on each side of the gate at the distance of 15 to 20 feet. The gate is shown complete with all its appurtenances, and the method of gearing, or principle of action, is shown separately, in three parts. It is one of the most popular of all "self-opening" gates. Some trouble was formerly experienced with these in times of deep snow, by their filling up with water and freezing, etc., but these difficulties are now principally overcome. *Fig. 1* shows the gate in position, *Fig. 2*, the attachments to the gate-post, and *Fig. 3*, the lever that swings the gate. A and A′ are double cranks, against which a wheel of the vehicle is driven, coming from either direction; this action, through the rod B or B′, is communicated to the hinge end of the gate at G and H, which draws the gate back, from the latch post E toward the hinge post F, sufficiently to unlatch it, and at the same time inclines the gate so that it swings open. The vehicle striking the elevated portion (shown in Fig. 11) of the other double crank, reverses the position so that the gate swings shut and fastens itself by a spring latch. Whether the gate be opened or closed, one portion of each double crank projects upward and the other lies flat. The post D is to catch the gate when it swings open and hold it. The letters in the detached parts correspond to those in the connected view.

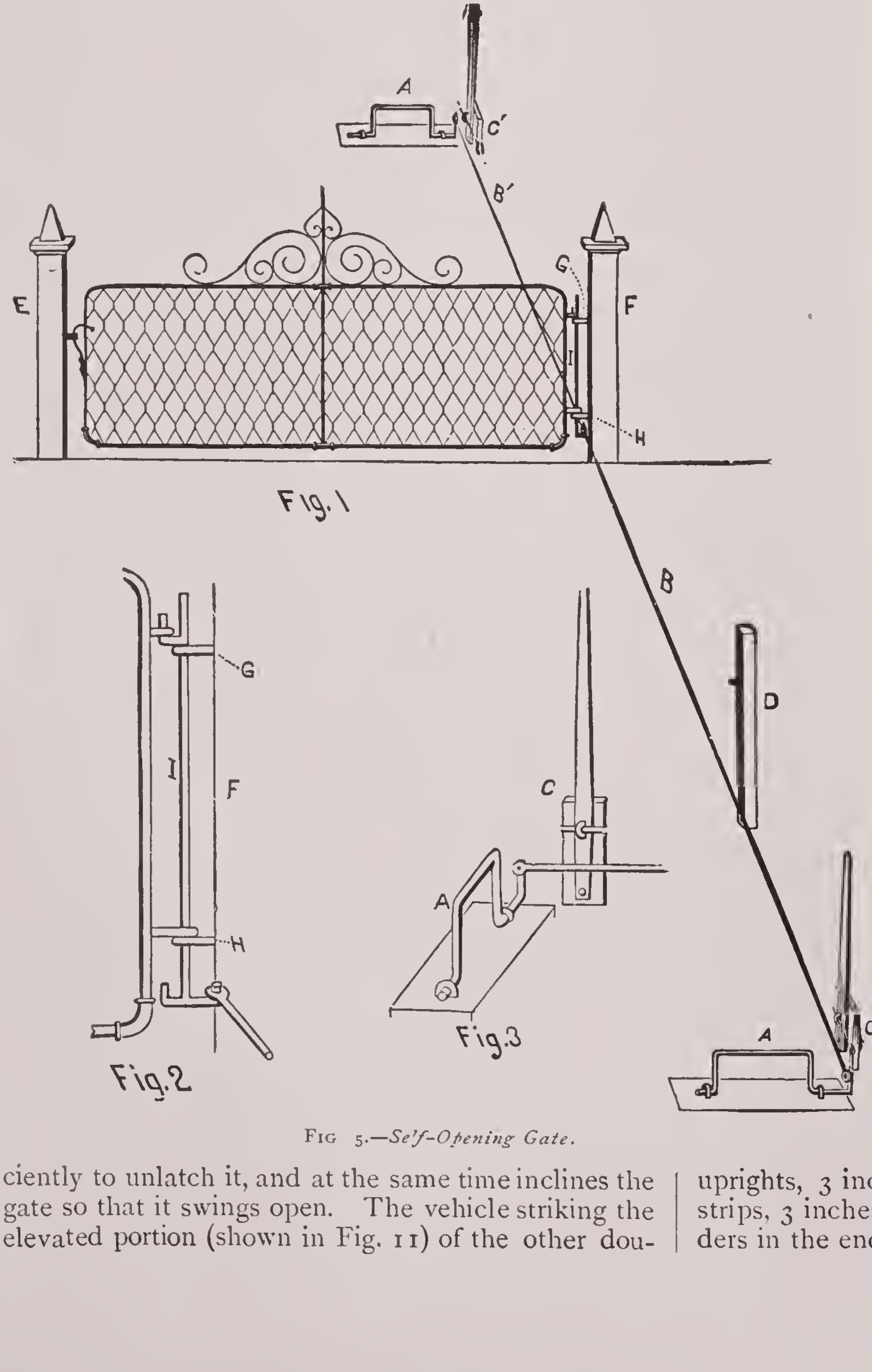

Fig 5.—*Self-Opening Gate.*

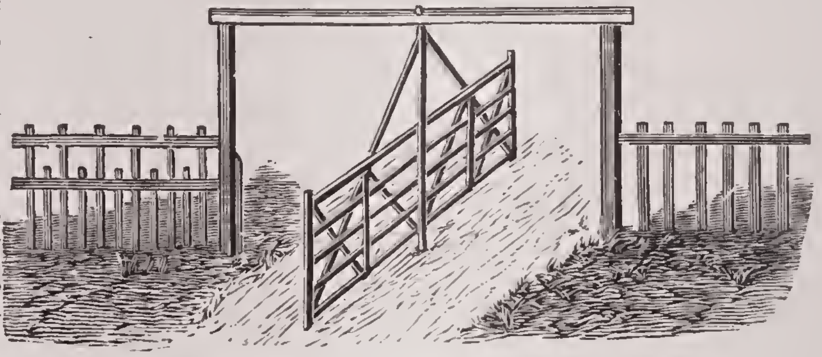

Fig. 6.—*Double Hingeless Gate.*

A cheap, hastily constructed and useful gate may be made by bolting the end and middle cross-pieces upon the bars, dispensing with a brace, and hanging it by the second bar from the top, on a pin that passes through and between two posts, or by two cross-pieces. This gate has the advantage of sliding backwards and forwards, making it easy to operate in close quarters.

Stock Gate. On farms where there are many cattle to be driven to and from pastures, a double hingeless gate, as shown by Fig. 6, will be found very convenient. Two high posts are set in the ground about 20 feet apart, and a scantling is put on, which extends from the top of one post to that of the other. A 2-inch hole is bored in the center of this scantling, and a similar hole in a block of wood that is planted firmly in the ground in the center of the gateway. The middle post of the gate frame is made round at each end to fit these holes, and this post is the pivot on which the gate turns. Those who have driven a number of cows (say 100) through a gate, know that it is a task that takes a good deal of time. With this gate one cow cannot block the passage; besides, there are no leaning of gate-posts, as the weight of the gate is wholly upon the block in the center.

Wood and Wire Gate. Fig. 7 represents an excellent wood and wire gate. To make it, obtain 3 uprights, 3 inches by 1½ inch, 5½ feet long, and 4 strips, 3 inches by 1 inch, 11 feet long. Cut shoulders in the ends of the strips, and saw out corresponding notches in the uprights. Make these 1½ inch, or half the width of the strips. The bottom notch is 2½ inches from the end of the upright, and the upper one 9½ inches from the top end. Fit the strips into the notches. There is then a space of 1 inch between the strips, into which put inch strips, so as to make all solid, and fasten together with carriage bolts. Braces 3 by 1½-inch are inserted, and held in place by bolts or wrought nails. Bore as many holes in the end pieces for ¼ inch eye-bolts as it is desired to have wires. Twist the wire firmly into the bolts on one upright, and secure the other ends to the corresponding bolts on the upright at the opposite end. In stretching the wires, pass them alternately on opposite sides of the center piece, and fasten in place by staples. This will, in a measure, prevent warping. By screwing down the bolts with a wrench, the wires may be drawn as tightly as desired. The hinges are to be put on with bolts, and any sort of fastening may be used that is most convenient. Barbed or smooth wire may be used. This is a neat gate, and being light, does not sag badly.

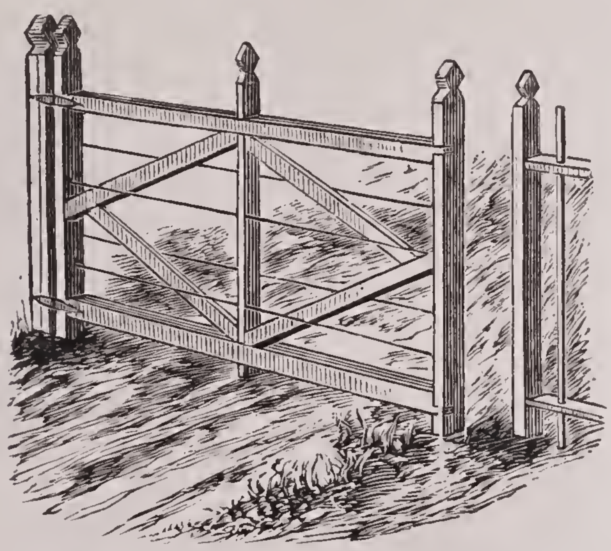

FIG. 7.—*A Neat Gate of Scantling and Wire.*

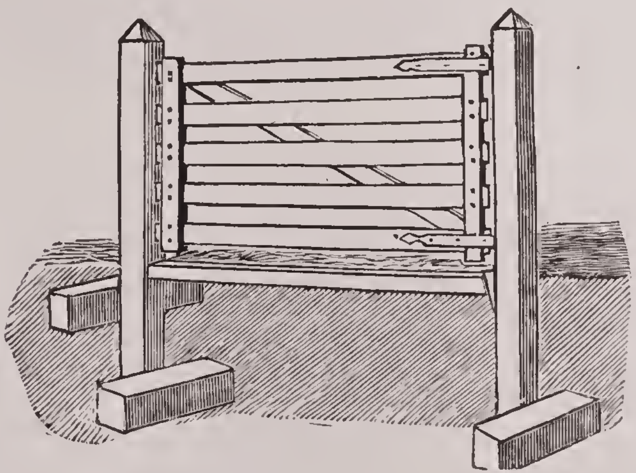

FIG. 8.—*A Substantial Farm Gate.*

Fig. 8 represents a very useful design. It can be constructed entirely of inch boards (fence boards) and 3¼-inch bolts; and any farmer can build it. An excellent method of fastening the bottom of the posts to keep them from leaning, is also shown in the engraving.

WIRE GATES. Very beautiful as well as substantial gates are made of wire, woven or otherwise worked into various patterns. Fig. 9 is a model of a standard wire farm-gate, and Fig. 10 is a cut of a yard or lawn-gate, and also illustrates the method of putting up a wire fence from the roll.

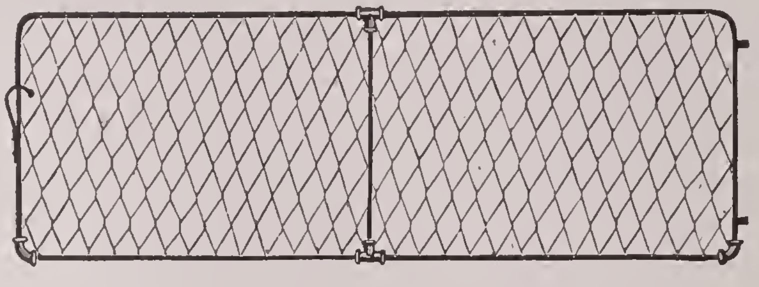

FIG. 9.—*Wire Farm Gate.*

Gate-hinges ought generally to be greased about once a month,—which chore will be more likely attended to if some grease is kept at hand enclosed in an auger-hole in the post.

The gate represented by Fig. 9, as well as those of Figs. 10 and 11, are made by Sedgwick Bros., Richmond, Ind. By Fig. 11 we illustrate one of the latest improved self-opening made by Ewald Over, Indianapolis, Ind.

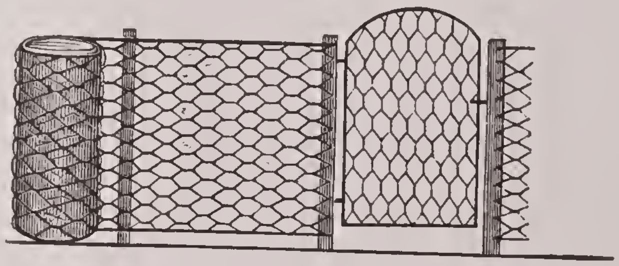

FIG. 10.—*A Wire Lawn Gate.*

LAWN GATES. On the subject of lawn and garden gates, etc., there is such diversity of taste and opinion that they are difficult to treat in detail. A farmer, mechanic, or banker, in constructing his hedges, fences or fancy gates, can have his choice from among the hundreds of different styles that at the present time are turned out from the factories, the same as sash and doors, and at a much less cost than they can be obtained elsewhere. The prices of these place them within easy reach, and, while no good business farmer will dispense with a sufficiency of well made, well kept gates, so no man of taste will allow his front yard to be disgraced by a slovenly gate, stile, or bars when a tasteful and ornamental gate is so easy to get.

For a gate that is much used in winter, and liable to be blocked with snow, many varieties of hinges are made, one of the best being an inch bar of iron 5 feet 8 inches long, with 7 inches of each end bent at right angles to the rest of the bar, which is straight. Bore two holes through the hinge head of the gate, from the back, 4 feet 6 inches apart, insert the bent ends of the bar, and draw up with the nuts until the bar is within about two inches of the head. The parts of the hinge which go through the post are made of iron of the same size, with a round hole in one end of each, through which the bar will pass easily, and a nut on the other to fasten them securely to the post. Bore the top hole through the post at such a height that when the hinge is inserted the top angle of the bar will rest on it and leave the gate hanging at the proper distance from the ground; now bore the hole for the bottom hinge about three feet below the top one. A sliding iron block with a set screw, on the bar between the two post hinges, and the apparatus is complete. The features which principally recommend this style of hinge are, first, its strength and durability; secondly, the ease with which it can be raised, by means of the block and set screw, to a height of 18 inches above its usual position, thus enabling it to pass clear of the accumulating snow. The best materials for gate-making are hard wood for the top and end pieces, and pine boards 1 x 6 for the rest, and bolts with nuts should always be used instead of nails.

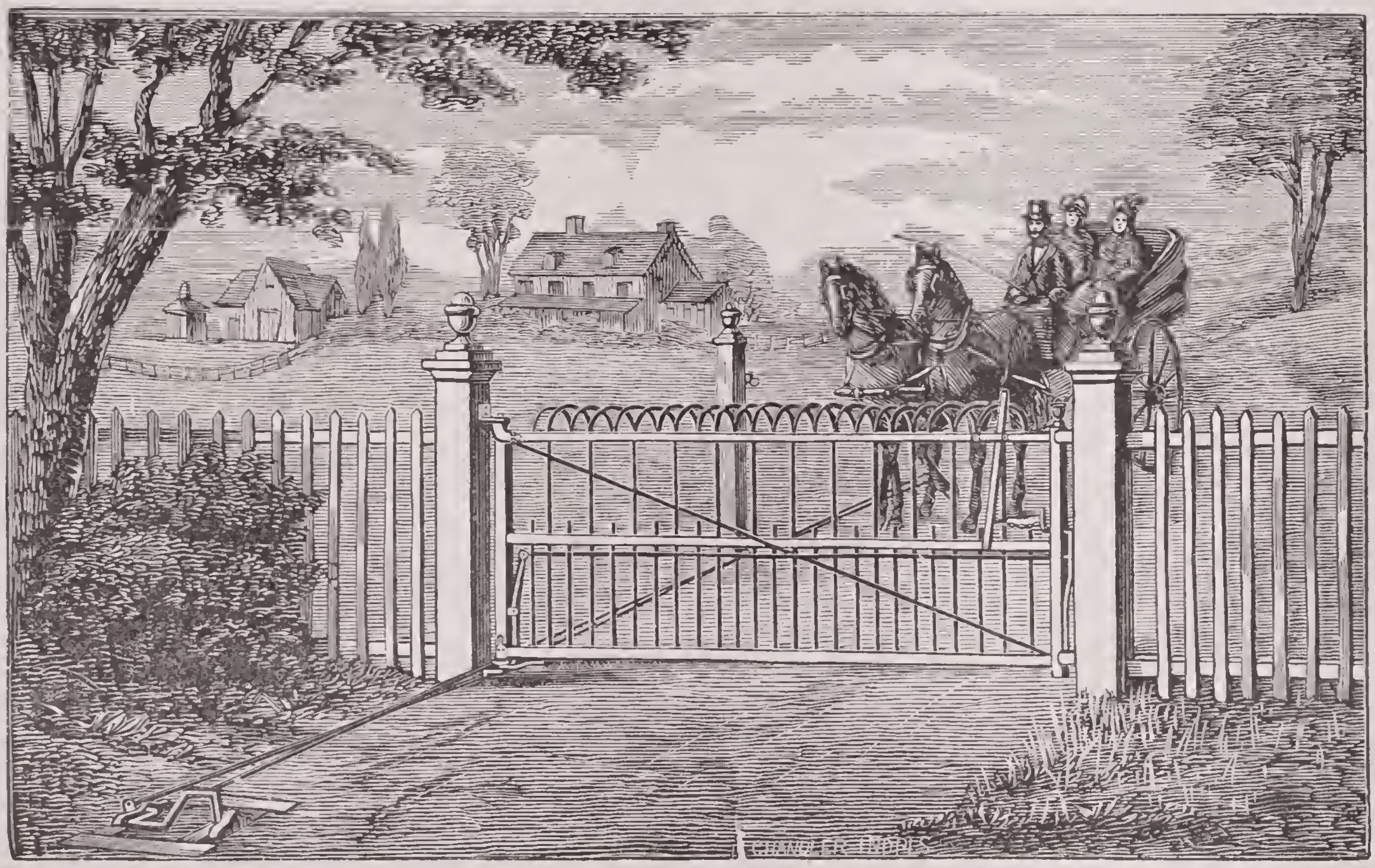

Fig. 11.—*Self-Opening Gate.*

Gathering, the rolling of grain swaths into cocks; the picking of part or whole of a crop of fruit from fruit-trees; the collecting and lifting of unearthed potato or other roots in the drill; the picking up of stones, weeds, or other injurious substances from the surface of the land; the pulling of flowers and the collecting of them into a bouquet; and any one of several other simple rural operations of aggregating a number of individual objects by hand.

Gauze, a very thin, slight, transparent stuff of silk or linen.

Gavel (gav′l), a sheaf of grain or flax not bound.

Gear, clothing; harness or trappings of beasts of burden; a toothed wheel or wheels, in machinery; running gear, the wheels and axles of a vehicle and their attachments, in distinction from the body.

Gearing, harness; connections in machinery for communicating motion. The terms "bevel-gearing," "frictional gearing," "belt-gearing," "spur-gearing," "valve-gearing," etc., are self-explanatory. A "gearing chain" is an endless one, with regular projections like those of a rack, passing like a belt around toothed wheels, and transmitting motion between them.

Gelatin (jel′a-tin), the "jelly" element of animal tissues. It abounds in many of the solid parts of animal bodies, particularly in the skin, the membranes, the tendons, the cartilages and the bones. It readily dissolves in boiling water; it forms a hydrate or solidifying solution, which, when passing from the solving heat to the ordinary temperature of the atmosphere, becomes a tremulous, semi-transparent jelly; and so great and diffusive is its power that a single pound of it will solidify or gelatinize 100 pounds of water. The presence of so much water causes the jelly readily to liquefy on the application of heat, and the gelatinizing power of the gelatin causes it readily to re-solidify on the return of cold; so that the jelly may many times be alternated between the liquids and the solid conditions, and still retain its characteristic properties. But when the jelly, or any hydrate of gelatine of tremulous consistency, is kept for some time, it acidulates and putrefies; while jelly reduced to a perfect solid state by the expulsion of its water by means of gentle heat, becomes a hard and brittle mass, and may be kept for any length of time without undergoing decomposition or change of properties.

Isinglass, which is made of the air bladders of fishes, when of the best quality, is pure, or nearly pure gelatin, and the purest found in commerce, glue being mixed with fatty and other matter, which are dissolved in combination with the gelatine, and all the jellies of cooks and confectioners being more or less affected with either natural admixtures or artificial admixtures, or both. It used to be taken as food, but was found to be too concentrated an element to be digestible.

Geld, to castrate, or deprive of testicles.

Gelding, the act of castrating; a castrated animal. A gelded (or gelt) horse is sometimes distinguished as a "gelding," or simply "horse," while an uncastrated horse is a "stallion," or "stud-horse;" a castrated bull is a "steer" or "ox;" a castrated boar is a "barrow;" a castrated ram is a "wether;" a castrated cock (rooster) is a "capon;" and a castrated man is a "ennuch."

Gems, Graham: see page 108.

Generation. The time when the phenomena of reproduction first exhibit themselves in animals is termed puberty. Then the reproductive organs, which previously were but slightly apparent, acquire a remarkable development, and in some species obtain certain external characters which remain during the whole course of their lives. Infancy is the period comprised between birth and puberty. It is during the time preceding puberty that the growth of the body chiefly takes place, although it may continue for some time afterward. The length of the period of infancy bears to that of life a certain relation, which may be regarded as almost constant. At the age of puberty, the mammalia assume the characters of maturity. Their height attains its greatest limit, and the distinctive marks of each animal become bold and well-defined. The physiognomy assumes a more animated expression; their voice becomes hoarser or stronger, and the fur handsomer; while the vivacity of their movements marks the impetuosity of those passions which animate them at this epoch. The male becomes distinguished from the female by colors which are commonly darker or browner, and in many species by certain definite external characters. Thus, some male apes acquire a beard and a coat of longer hair; the lion obtains a mane; and stags and roebucks are armed with branching horns, of which the females are nearly always deprived. He-goats and rams are at once distinguished from the females by their horns, their masculine gait and combative disposition. This superiority in the males is most marked among the ruminantia, which are commonly polygamous, and where, each male having several of the other sex to keep in subjection, it becomes necessary to assign him a physical superiority, unnecessary in the monogamous species, where the sexes are always more equal in strength.

Puberty constantly exhibits itself much sooner in females than in males, although the reproductive power remains longer with the latter than with the former. In our climates man attains this condition at the age of fifteen or sixteen and woman at the age of fourteen or fifteen; in warmer climates, it exhibits itself at the age of twelve to fourteen in the former, and ten to twelve in the latter. Dogs are capable of reproducing at the age of nine or ten months; cats from a year to eighteen months. A lioness of the menagerie at Paris was six years old when she exhibited these phenomena for the first time. Rabbits can procreate at the age of five or six months; hares a little later; and guinea-pigs at five or six weeks. Horses produce at two years and a half and mares a little sooner. Camels, according to the ancients, at three years; wolves at two years; cows at eighteen months; bulls six months later; the she-ass from eighteen to twenty months, and the ass two years. It is, however, the interest of the farmer to prevent the domestic animals from procreating before they have attained their full growth. There are certain seasons of the year when most mammalia become susceptible of the instincts of reproduction. This is termed the rutting season, during which the usual character of the animals is totally changed, especially the males. The most timid animals, being excited by the abundance of food and the internal suggestions of instinct, acquire a degree of courage and even fury, which urges them on in a career of madness, which can be compared only to the habitual ferocity of the most formidable species. The females also, at this period, lay aside their habitual reserve, and are seen to provoke the males by biting, teasing, and following them everywhere.

The external signs of the rutting period vary greatly with the several species. In those which are capable of procreating at all seasons, such as man, the monkeys, dogs, cats and horses, no particular sign is observed. It is different with the rodentia. We find, likewise, that all those odoriferous mammalia which are supplied with pouches from which the odors emanate, emit their odors at this time with unusual force. In the great number of animals belonging to the deer genus, and in several antelopes, the larynx or windpipe of the male projects considerably; and it cannot be doubted that the change of tone which his voice undergoes is owing to this cause. It usually happens that the female exhibits the external signs of the rutting season in a milder and more subdued form than the males. Among the mammalia, and indeed in all living beings, the period of puberty and reproduction is one of energy and strength; and all their affections become more ardent and their wants irresistible.

The term rut, from *ruere*, to rush headlong, serves to illustrate the fury which transports these lower animals. Alike ferocious and untamable, they are susceptible at this period neither of fear or any other passion, and seem deaf even to the calls of hunger or sleep. The bull leaves the meadow and rambles everywhere in search of his mate. The forest resounds with the howling of contesting wolves, and the lion, with a deafening roar, defies his rival to the combat.

We may easily perceive the final cause of these contests among the lower animals during the rutting season. Nature ever sacrifices the interests of individuals towards the perfection of species. The most vigorous males always possess the most formidable weapons of attack and defense, while the more effeminate individuals exhibit their feebleness at once in their horns and their want of courage. It is especially among the polygamous races where these combats of the rutting season are more conspicuously observable, because each male fights for several females. In the monagamous species, on the contrary, where the number of the sexes are nearly equal, these battles seldom occur. Again, in the carnivora, when the number of males surpasses that of the females, duels become both frequent and sanguinary. The seals are, perhaps, more polygamous than any other of the mammalia. Each maintains a kind of seraglio or family, composed, perhaps, of one hundred and twenty females, which he defends from the approach of any other male with the utmost jealousy and rage. Other species, less faithful or more complaisant, pass from conquest to conquest, and pay their court to all the beauties of the neighborhood.

The duration of this season varies with different species, but, in general, among the wild animals, it ceases as soon as the females have been fecundated. With most of the latter, the external signs of the rut immediately disappear; the females assume their usual reserve, and repel with rudeness the approaches of the male. There are exceptions in the monkeys, the mare, and in our own species. The female rabbit is likewise an exception, though only an apparent one; as from the peculiar formation of the matrix, she is susceptible of a two-fold impregnation or superfœtation. In some species of domesticated animals, especially in the dog, copulation is maintained for a long time after the emission of the fecundating fluid; whilst among the greater part of the birds, especially in the Gallinæ, the union is instantaneously dissolved. It is always wrong in the former cases to force a separation, which is sometimes attempted, although opposed by the peculiar organization of the sexual organs; the intention of Nature apparently being, by this extraordinary prolongation of the union, to render conception more certain. After conception, as has already been observed, the females, in general, repel the approaches of the male. In all cases where the races are peculiarly ferocious, as in the lion, tiger, panther, and other large cats, the females are the first to solicit the approaches of the male. Had this not been the case, it is difficult to conceive in what manner their races could have been continued. In species of a milder disposition, the males endeavor to please the other sex, and often exhibit a strongly-marked feeling of jealousy toward their own. The monkeys remain attached to one or two females, rarely to more. Their union seems to be a kind of marriage; they require fidelity, are exceedingly jealous, and severely punish their female companions, who are well-disposed to coquetry, on finding them in company with other males. See Gestation.

Gentian (jen′shen), a medicinal plant of Europe. The root has a yellowish brown color, a very bitter taste, and much used in stomach bitters, and to some extent in other medicines, both for man and beast. The several species of gentian in this country are not so good for medical purposes.

Genus (je′nus; plural, gen′er-a), the next natural grouping above species. Each genus comprises one or more species. See Species.

Germination, the act of sprouting; the beginning of vegetation in a seed or plant; also, the time in which seeds vegetate, after being planted or sown.

Gestation, the time during which a female, who has conceived, carries the embryo in her uterus. Among birds and all other oviparous animals, a real gestation can not exist, because the eggs detach themselves from the ovaries as soon as they are grown, and are deposited. With these animals, gestation becomes superseded by incubation, to which it is generally analogous, and the former functions may thus be considered as little else than an internal incubation. The apparent design of nature, in both cases, is to favor the natural development of the embryo or fœtus, the first rudiment of the new animal resulting from conception. It is also observed that the rapidity of growth in the fœtus, whether during the gestation of the viviparous animals or the incubation of the oviparous, always diminishes in proportion as the fœtus approaches the time appointed by nature for its birth. The length of the period of gestation, like that of incubation, varies greatly among the several genera and species. It further obtains certain accidental variations, which appear to depend upon the age of the mother, her state of health, an increase or diminution in the velocity of the circulation, the quantity or quality of the food, and all those causes, derived from the influence of climate, soil, shelter, and the different kinds of treatment which these animals receive from the hand of man.

The period of gestation may also be either shortened or prolonged, according to the temperature which prevails during that interval. It is a matter of common observation among graziers, that two cows, though fecundated on the same day, will yet produce at an interval of several weeks. The variation among sheep under similar circumstances amounts to a few days, but in general this difference among domestic animals of the same species may extend as far as 20 days. It commonly happens in all those species where the individuals take a long time in arriving at their full growth, that the period of gestation is considerably prolonged; and the converse is equally true, for in all those species which are very precocious, the time of gestation is extremely short. This rule is not, however, without many exceptions. Thus, the goat and sheep are capable of reproducing at the age of two years, and have commonly attained their full growth at this period, while their ordinary time of gestation is about five months.

The duration of gestation seems further to depend upon the comparative volume of the species; this rule, however, is by no means invariably preserved. Thus, the ass and zebra, though less in volume than the cow and buffalo, employ less time in performing this function than the latter species.

It hence appears that the duration of gestation varies in different animals, and the empirical laws deduced from multiplied observations are not without many exceptions. By combining, however, the general organization of the mammalia with the time necessary for each animal to arrive at its full growth, as well as with the comparative bulk of the females, it is possible to obtain a general and definite result; while the characteristics thus obtained may, with propriety, be added to those which commonly serve to distinguish the leading groups of mammalia. Thus in man, nine months is the well known period of gestation. Among the quadrumana it is also nine months for the larger species, but only seven for the smaller. In the carnivora, gestation endures six months with the bear; 108 days with the lion; nine weeks with the Arctic fox; from 55 to 56 days with the cat, the same period with the martens and weasels; from 62 to 63 days with the dog.

Those mammalia which experience the shortest term of gestation are unquestionably the animals belonging to the order marsupialia. Among the large kangaroos, for example, the young are scarcely more than an inch in length when they first attach themselves to the breasts of their mother, although the full-grown animal is at least five feet in height. Gestation is also of short duration in the rodentia, being only four months in the beaver, one of the largest animals of this order. It is still less in the smaller rodentia, being from 30 to 40 days in the hares and rabbits, 31 days in the dormice, four weeks in the squirrels and rats, and three weeks in the Guinea pig. Among the pachydermata, gestation is of much longer duration; it endures with the elephant from 22 to 23 months; it lasts from 11 to 12 months with the horse and ass; in the zebra, for a year and some days; in the tapir, from 10 to 11 months; in the hog and boar, for four months. Further, it endures among the ruminantia, for 12 months in the dromedary; for nine months in the female buffalo and cow; for eight months and some days in the females of the common red deer and the reindeer; five months and a half for the roebuck; five months for the goat, the sheep, the moufflon, and several antelopes. According to observations of M. Teissier, of Paris, in 582 mares, which copulated but once, the shortest period was 287 days, and the longest 419; making the extraordinary difference of 32 days, and of 89 days beyond the usual period of eleven months. The proper age for reproduction (see Generation) of course varies in the different animals, as well as the length of time they carry their young. The mare is usually bred at four years of age, but should she be kept as a breeder it is more favorable that she drop her first colt at three years old, then rest one year, so as to produce the next colt at five years of age, and yearly thereafter. Most mares will receive the horse on the ninth or tenth day after foaling, and this period should never be allowed to pass over without her being shown the horse. The sow will breed at one year old, the ewe at fifteen months, and the cow at two years old. The usual period of gestation with the cow is between nine and ten months, though with a bull calf the cow will go about 41 weeks, and a few days less with a female. Any calf produced at an earlier period than 260 days is considered premature, and any longer than 300 days is considered irregular. Sheep usually bring forth their young in five. Swine usually farrow between the 120th and 140th day, the variations to which they are liable being influenced by the size and particular breed. The bitch is almost universally regular, whether large or small, pupping occurring about the 63d day. The cat produces either on the 55th or 56th day. For a valuable table on this subject, see breeding calendar, page 117.

The accompanying table will be found quite valuable as giving the proper age of reproduction of all domestic animals and fowls, the length of time they continue to reproduce, the seasons, etc. This, in connection with the table on page 117, will be found very convenient and valuable to the farmer:

Kinds of Animals.	Proper Age for Reproduction.	Period of the Power of Reproduction.	Number of Females for one Male.	The most Favorable Season for Copulation.	Period of Gestation or Incubation.		
					Shortest Period.	Mean Period	Longest Period.
		Years			Days.	Days	Days.
Mare	4 Y'rs	10to12	......	May	322	347	419
Stallion	5 "	12to15	20to30	......	......	......	......
Cow	3 "	10	......	July	240	283	321
Bull	3 "	5	30to40	......	......	......	......
Ewe	2 "	6	......	Nov.	146	154	161
Tup	2 "	7	40to50	......	......	......	......
Sow	1 "	6	......	Mar.	109	115	143
Boar	1 "	6	6to10	......	......	......	......
She-Goat	2 "	6	......	Nov.	150	156	163
He-Goat	2 "	5	20to40	......	......	......	......
She-Ass	4 "	10to12	......	May	365	380	391
He-Ass	5 "	12to15	......	......	......	......	......
She-Buffalo	......	......	......	......	281	308	335
Bitch	2 "	8to9	......	Feb.	55	60	63
Dog	2 "	8to9	......	......	......	......	......
She-Cat	1 "	5to6	......	......	48	50	56
He-Cat	1 "	9to10	5to6	......	......	......	......
Doe-Rabbit	6 Mo.	5to6	......	Nov.	20	28	35
Buck Rabbit	6 "	5to6	30	......	......	......	......
Cock	6 "	5to6	12to15	......	......	......	......
Turkey on Eggs of Hen	......	......	......	......	17	24	28
Turkey on Eggs of Duck	......	......	......	......	24	27	30
Turkey on Eggs of Turkey	......	......	......	......	24	26	30
Hen sitting on Eggs of the Duck	......	......	......	......	26	30	34
Hen sitting on Eggs of the Hen	......	3to5	......	......	19	21	24
Duck	......	......	......	......	28	30	32
Goose	......	......	......	......	27	30	33
Pigeon	......	......	......	......	16	18	20
Guinea Pig	8 Mo.	......	......	......	......	21	......

It is evident that the number of births appropriate to each species will mainly depend upon the average length of each period of gestation. On this account the larger species do not produce each year, especially when a long period of lactation also intervenes. The smallest species, on the contrary, multiply most prodigiously, and it may be generally stated that, if we except the rabbit and hog, both the number of births and the number of young ones at each birth are in general more considerable in proportion as the size of the animal is less. The guinea-pig can produce every two months; the hampsters, the rats, the mice, the field mice and the shrews do not produce less than three or four litters in the course of the spring, summer and autumn. The number of young in each litter also bears an immediate reference to the length of gestation. At each birth, man and the quadrumana commonly produce only one, very rarely two or more, and the cheiroptera bear two. Among the carnivora the tiger produces one; the lion three or four; the cat four or five; the arctic fox from five to seven; the badger from three to four; the mole from four to five, and the seals one or two. Among the marsupialia, the opossums produce from eight to ten, but the kangaroos only one or two. Of the rodentia, the beaver bears two or three at a birth; the rabbit from four to eight; the hampster from five to six; the common rat, the mouse, and the brown rat or surmulot, from eight to ten. The agouti bears four, according to Laborde, or only two according to Buffon and d'Azara. The garden dormouse produces five or six young ones at a birth; the common dormouse three or four. Among the edentata, the sloths produce only one, as also the ant-eaters, while the armadillces bear four at each of their births, which occur pretty frequently. With the exception of the pig the pachydermata produce but few young at a time; thus the elephant, the rhinoceros, hippopotamus, tapir, and all the horse genus, have only one; the peccary has two, while the pig will bear as many as twelve, and even twenty. All the ruminantia produce two or more, excepting the largest species, which have only one. The cetacea produce, in general, but one young one at each birth. It most commonly happens that the first and last litter of each animal are deficient in number, and often also in strength. It thus appears that the largest and most formidable species are far less fruitful than the smallest and weakest. Not only are the former longer in arriving at their age of puberty, but their periods of gestation and lactation are prolonged, and the number of young at each birth is, in general, less. Thus, while the tiger produces only one cub at a time, the wild-cat will bear four or five. In this manner the lower tribes become extremely numerous; and, but for this surprising fecundity, from their natural weakness, they would quickly be extirpated. The breed of mice, for instance, would have long since been blotted from the face of the earth, were the mouse as slow as the elephant. But it has been wisely provided that such animals as can make but little resistance, should at least have a means of repairing the destruction, which they must often suffer, by their quick reproduction; that they should increase even among enemies, and multiply under the hand of the destroyer. On the other hand, it has as wisely been ordered by Providence that the larger kinds should produce but slowly; otherwise, as they require proportionate supplies from Nature, they would quickly consume their own store, and, of consequence, many of them would soon perish through want, so that life would thus be given without the necessary means of sustenance. In a word, Providence has most wisely balanced the strength of the great against the weakness of the little. Since it was necessary that some should be great and others mean, since it was expedient that some should live upon others, it has assisted the weakness of one by granting it fruitfulness, and diminished the number of the other by infecundity.

The young of nearly all mammalia are born with their eyes closed, and do not open them for several days. The mother cuts the umbilical cord with her teeth, and, even without being carnivorous, devours the membranes or after-birth, as in the cow, the sheep, and many others.

Gherkin, a small species of cucumber used for pickling.

Giddiness, a well-known symptom of numerous affections of the brain and the stomach in man and the lower animals; and thence loosely identified by multitudes of the rural population with some specific diseases of the animals of the farm. Apoplectic affections are sometimes called giddiness. Epileptic affections are more frequently called giddiness, and they, at the same time, bear the popular names.

Giddiness is also very often symptoms of hysterics and dyspepsia. Very little danger attends the complaint unless it be caused by too great a fullness of blood in the vessels of the brain. Should this be the case immediate attention should be given it or it may terminate in apoplexy or palsy. When giddiness arises from some disease it will disappear by the removal of that disease.

In treating giddiness ascertain its cause and remove that. Should it, however, be a primary affection, seated in the head, or is from a disordered stomach, a purgative should be occasionally given. An emetic should be given once in a while if the stomach be cut of order. If the brain is the seat of the complaint take a podophyllin purgative. The feet should be frequently bathed, and the circulation equalized.

Gilding. The following is a recipe for a good wash for cleaning gilding: Quicklime, 1 ounce; slack with a sprinkling of hot water; gradually add 1 pint of boiling water so as to form a milk; dissolve 2 ounces pearlash in 1½ pints boiling water, mix the two solutions, cover, agitate occasionally for an hour, allow it to settle, decant the clear, put it into flat, half-pint bottles, and cork them down well. It is used to clean gilding, etc., either alone or diluted with water. It is applied with a soft sponge, and then washed off with clean water.

TO REMOVE GILDING FROM OLD CHINA. Take soft water 8 parts, nitric acid 8 parts, common salt 4 parts, sal ammoniac 1 part. Let it boil; put the china into it, and rub with a stiff brush.

TO RENEW GILT FRAMES. Take sufficient flour of sulphur to give a golden tinge to 1½ pints of water, and boil it in five onions, strain, and when cool apply to the parts that require restoring, with a soft brush ; it will come out good as new, when dry.

Gilt, a young female pig.

Gin, distilled spirit, flavored with juniper berries. In machinery, an arrangement for tearing green-seed cotton wool from the seeds. It consists of a cylinder closely set with saws which pass through a grating in an inclined side-hopper, and thus drag off portions of the wool. It is also a machine for raising great weights, driving piles, etc. It usually consists of three long legs or spars, which support a pulley at the top round, over which a rope is passed for elevating the weight.

Ginger, an aromatic root from the East Indies, popular in medicine and cookery. It is a grateful stimulant, allaying pain by expelling foul gases from the stomach, and is often given in dyspepsia, flatulent colic and certain feeble states of the alimentary canal. Good for teas to produce sweats, or rather to flavor hot water so that a large portion can be drank without nausea.

Ginger-Bread: see page 144.

Ginger Pop. To make ginger pop, take 2 ounces best white Jamaica ginger root, bruised; water six quarts; boil 20 minutes; strain and add 1 ounce cream tartar, 1 pound white sugar; put on the fire, and stir till all the sugar is dissolved, and put in an earthen jar. Now put in ¼ ounce of tartaric acid, and the rind of 1 lemon. Let it stand until the heat has attained 70°, or till you can bear your hand in it with comfort; then add 2 tablespoonfuls of yeast; stir well; bottle for use, and tie the corks. Make a few days before it is wanted for use.

Ginseng, a plant native in the United States, the root of which has an agreeable, spirituous and aromatic flavor, and has been used a little in medicine. A few persons have contracted the habit of chewing it, as tobacco. Very popular in China.

Girder, the principal piece of timber in a floor, girding or binding the others together; any beam supported at both ends.

Girdling, the removal of a belt of bark from a living tree, with the design of arresting the ascent of the sap, and in consequence killing the tree. This operation is a common method of effecting clearances in our woods, and requires to be performed early in the spring before the commencement of the annual alburnous deposition. It promptly kills most kinds of trees, yet is sometimes baffled for some years by the sugar maple and the entire-leaved tupelo.

Girl: see Children, page 233.

Girth, the circumference of the stem of a tree, of the body of an animal, or of any other member of an organized and living being.

Glanders, a contagious and very destructive disease of the mucous membrane in horses, characterized by a constant discharge of sticky matter from the nose, and an enlargement and induration of the glands beneath and within the lower jaw. This has been considered the most formidable disease with which the veterinary surgeon is called to contend, and been said to form the *opprobrium medicorum* of the veternarian's art. It is communicable to man.

Glass. TO CLEAN WINDOWS AND MIRRORS. Tie up some finely powdered whiting in a small piece of muslin. Dab it over the glass thoroughly ; the dirtier the glass the more whiting will adhere to it. Next smear it evenly with a damp rag, and let it remain till perfectly dry; then rub it off with a leather. This is an easy, clean and thorough plan. If alcohol be used instead of water, it will dry in much less time, and polish the glass better. The corners of the window panes should receive particular attention. Ammonia, in solution, is popular for cleaning windows, and soda, kerosene or turpentine is good to aid in cleaning off paint.

Another recipe for cleaning mirrors is to take part of a newspaper, fold it small, dip it in a basin of clean, cold water, and when it is thoroughly wet squeeze it out as a sponge, and then rub it hard over the face of the glass, taking care that it is not so wet as to run down in streams. After the glass has been well rubbed with wet paper, let it rest a few minutes, and then go over it with a fresh newspaper, till it looks clear and bright, which it will do almost immediately. The inside of windows may be cleaned in this way, and they will look brilliantly clear.

TO RESTORE THE COLOR OF WINDOW GLASS. Window glass constantly exposed to the action of the sun and rain soon deteriorates, as the potash or soda which it contains combine with the carbonic acid of the air. A whitish opaqueness is the result of this action. To restore the pane to its original clearness, rub it with dilute muriatic acid and then clean with moistened whiting. It is said that glass in an extreme state of decomposition may be restored by this means.

TO CLEAN BOTTLES. Chop up a potato very fine, put it in the bottle with warm water, and shake rapidly until clean. Some use shot and soda, but the potato is the most effectual. Castor bottles can be washed by filling them one-third full of rice and adding warm water. Shake them well and they will be cleansed thoroughly. Bottles and phials that have contained medicine may be cleansed by filling each one with ashes, and immersing them in a pot of cold water, then heating the water gradually till it boils. Afterwards rinse them in soap-suds, then in clean water.

Glassware can be placed in hot water without being broken or cracked, if it is put in edgewise and turned rapidly over a few times.

To Clean Glass Globes. If the globes are much stained on the outside by smoke, soak them in tolerably hot water with a little washing soda dissolved in it; then put a teaspoonful of powdered ammonia in a pan of lukewarm water, and with a tolerably hard brush wash the globes till the smoke stain disappears; rinse in clean, cold water, and let them drain till dry; they will be quite as white and clear as new globes.

To Mend Broken Glass. Dissolve shellac in alcohol to about the consistence of molasses, and with a thin splinter of wood, or pencil brush, touch the edges of the broken ware. In a short time it sets without any heating, which is often inconvenient. It will stand every contingency but a heat equal to boiling water.

Another: A colorless, transparent cement to mend glass can easily be made by dissolving isinglass in spirits of wine. Add a little water and mix gently, over a moderate fire.

To Keep Glass from Breaking when Suddenly Heated. Glass is a very poor conductor of heat, and when hot water is poured suddenly into a tumbler or goblet, it is almost certain to break unless the glass itself is quite warm. Tepid water should be first used, or a little cold water poured into the glass, on which the hot water may be poured. Lamp chimneys frequently break when first placed over the light, especially if taken from a cold room. The proper remedy is to turn up the lamp by slow degrees; this will gradually heat the glass and prevent breaking.

To Remove Glass Stoppers. Rub a feather dipped in oil round the stopper, close to the mouth of the bottle; place the mouth of the bottle towards the fire, about two feet from it. When warm, strike the bottle lightly on both sides, with any convenient wooden instrument, and take out the stopper. Or, a cloth wet in hot water, and applied to the neck, will cause the glass to expand, and the stopper may be removed.

To Break Glass in Required Shape. Dip a piece of worsted thread in spirits of turpentine, wrap it round the glass in the direction required to be broken, and then set fire to the thread, or apply a red-hot wire around the glass; if it does not immediately crack, throw cold water on it while the wire remains hot. By this means glass vessels that have been broken may often be fashioned and rendered useful for a variety of purposes.

To break a glass bottle or jar across the circumference—place the bottle in a vessel of water to the height where it is designed to break it; also fill the bottle to the same level. Pour coal oil inside and out on the water. Cut a ring of paper fitting the bottle. Saturate with alcohol or benzine so that it touches the oil. Pour also some inside the bottle. Set on fire. The cold water prevents the glass from heating below its surface, while the expansion caused by the heat will break the vessel on the water line.

To Cut Without a Diamond. Scratch the glass the shape you desire with the corner of a file or piece of hard stone, then, having bent a piece of wire to the same shape, heat it red hot, and lay it upon the scratch; sink the glass into cold water just deep enough for the water to come almost on a level with its upper surface, and it will break smooth at the line made. With care, a piece of quartz can be used as effectually as a diamond.

To Drill Glass. Glass is drilled by the use of diamond dust or by friction. It is also done by wetting an ordinary drill with petroleum or benzine; turpentine will answer, though not as well; it will then bore common glass nearly as rapidly as steel. If it is intended to bore through, the glass should first be countersunk on each side with a very flat three-sided pyramid. Flint and plate glass are very difficult to bore. It is stated that at Berlin, glass castings are drilled, planed and bored like iron ones, and in lathes, etc., by the use of dilute sulphuric acid.

Glass-Eye. This abnormal condition of the eye of the horse consists in dilatation of the pupil, uninfluenced by light or darkness, and is occasioned by paralysis of the optic nerve and its ultimate expansion.

Glauber's Salt, sulphate of soda; a very common and useful purging salt. See Epsom Salt.

Gleaning, collecting the refuse of the harvest.

Gloves. The simplest and most successful method for cleaning kid gloves is to take a pint of naphtha, wash your gloves in it as if it were water, rubbing the parts soiled most. Wash two or three times in clean fluid, according to the needs of the soiled gloves. The usual care should be taken, as the fluid is highly explosive.

To Prevent Injury from Perspiration. Apply ordinary corn starch (dry) to the hands before drawing on the gloves. Pulverized soap-stone will answer the same purpose.

To Remove Stains from Gloves. Stains may be removed from the most delicately colored gloves by suspending them for a day in an atmosphere of ammonia. Provide a tall glass cylinder, in the bottom of which place a small quantity of aqua ammonia. Be careful to remove from the sides of the jar any ammonia that may have been spattered there. Suspend the gloves in the top of the jar, by the stopper. They must not come in contact with the liquid.

Glucose, a chemical combination of sulphuric acid and starch, which to most persons has a sweetish taste and in a measure takes the place of sugar. Made in large factories, as it is, it necessarily has in it such poisonous substances as free sulphuric acid, chlorides of tin, calcium, iron and magnesia, sulphate of iron, copperas, or lime, in quantities less or greater. Even perfectly pure glucose is not as sweet as cane sugar, the difference being that one pound of the latter will sweeten as much as two and a half pounds of the former. Glucose is being introduced largely into all the sugars and sirups of commerce, and its manufacture is being rapidly increased every year. The dealers hold out to the farmers the inducement that the price of their corn will be greatly enhanced by its conversion into glucose, and of course they are very ignorant or incredulous concerning its effect upon human health.

Glue, a tenacious cement, principally used by cabinet-makers, joiners, book-binders, case-makers and hatters. The substances from which glue is made are the shreds or parings of hides; the ears before they are immersed in the tanners' vats; the cullings and raspings of horn from the comb-maker and the button-maker; the hoofs and horns of oxen, calves, and sheep from the butcher; the pelts of the hare, rabbit, beaver, etc., from the hat-makers, beaver-cutters, and furriers; and the parings of vellum and parchment from the white leather dresser, glover, etc. These substances are indiscriminately mixed together and are purified from all grease and dirt by a digestion in lime water, the greatest care being taken to remove every piece that is in the slightest degree putrescent.

To Prepare Glue for Family Use. Crack up the glue and put it in a bottle. Add to it common whisky; shake up, cork tight, and in three or four days it can be used. It requires no heating; will keep for almost any length of time, and is at all times ready for use, except in the coldest weather, when it will require warming. It must be kept tight so that the whisky will not evaporate. A tin stopper covering the bottle, but fitting as closely as possible, must be used.

A Strong Glue That Will Resist Moisture. Dissolve gum sandrac and mastich, of each ¼ of an ounce, in ¼ pint spirits of wine, to which add ¼ ounce spirits of turpentine. Take strong glue, or that in which isinglass has been dissolved; put the gums in a double glue pot, add the glue by degrees, constantly stirring it over the fire till the whole is well incorporated; strain it through a cloth, and it is ready for use. It may now be returned to the glue pot, and ½ ounce very finely-powdered glass added. Use it quite hot.

Strong Isinglass Glue. An ounce of best isinglass dissolved in a pint of water. Strain the solution through a piece of cloth, and add to it a proportionate quality of the best glue, which has previously been soaked in water for 24 hours, and a gill of vinegar. After the whole of the materials have been brought into solution, let it once boil up, and strain off the impurities. This glue is adapted for any work which requires particular strength, and where the joints themselves do not contribute toward the combination of the work.

Liquid Glue. Take gum shellac, 3 parts by weight, caoutchouc (India rubber) one part by weight. Dissolve the caoutchouc and shellac, in separate vessels, in ether, free from alcohol applying a gentle heat. When thoroughly dissolved, mix the two solutions, and keep in a bottle tightly stopped. This glue resists the action of water, both hot and cold. Pieces of wood, leather or other substances, will part at any other point than where joined. Or, take a bottle two-thirds full of best common glue, and fill up the bottle with common whisky; cork it up, and set by for three or four days, and it will dissolve without the application of heat.

It will keep for years, and is always ready to use without heat, except in very cold weather, when it may need to be set a little while in a warm place, before using.

To Prevent Glue from Cracking. Add to the glue a very small quantity of glycerine, the quality modified according to circumstances.

To Keep Glue From Souring. Put in a little muriatic acid and it will preserve glue in good condition for a long time. It will neither dry up nor ferment. Liquid glue is made in this way, and sold in bottles. The use of a small portion of the sugar of lead will also prevent fermentation.

Glume, the husk and chaff of wheat and grain plants.

Glut, in mechanical work, a large wooden wedge used in splitting timber.

Gluten (glu′ten), the viscid, tenacious substance which gives adhesiveness to dough. It may be separated from the flour of grain by a current of water, the starch and other soluble matters being thus washed out. Gluten consists of glutine, vegetable fibrine, and caseine, with sometimes a fatty substance. The darker and more nutritious portion of wheat grain is that which gives Graham flour its dark color. Good wheat flour contains from 19 to 24 per cent of gluten. The wheat of warm climates is much richer in gluten than that of colder regions. It is owing to the large quantities of this substance in Italian flour that paste made with it is sufficiently tenacious to be drawn out into vermicelli. Of all vegetable substances gluten appears to be the most nutritious.

Glutton, is a term used by some horticulturists to denote those "water-sprouts" or "suckers" which especially grow upon diseased or over-pruned apple-trees; a very appropriate designation.

Gluttony. As the stomach was never intended to do all the work that ignorance of a depraved appetite so commonly provides for it, the exquisitely perfect machinery soon gets out of order from excessive eating, which is in fact at least as mischievous, if not actually more so, than excessive drinking. If we could see the effects of the former—the crowd of diseases, the myriad ghosts of those who die early, and all the varied horrors which are so frequently associated with deaths and diseases,—we should cry out as loudly against gluttony as we now do, and justly, against drunkenness. Temperance in eating and drinking is, when combined with the judicious selections of food and drink, the real source of health, and those are wise who know this and act upon their knowledge. Happiness consists more largely than many people imagine in eating and drinking wholesome things in proper quantities. The process of digestion ought always to be easy and pleasant, and it is not a bad old rule always to finish a meal before the food has lost its relish. The kind, quantity, and quality of a man's ailment ought to bear a just proportion to the strength of his constitution, the amount of exercise he takes, and the condition of his digestive organs. If he can immediately after dinner write, or walk, or go about his ordinary business or pleasure; after supper sleep soundly and rise in the morning free from fever, with no bad taste in his mouth, refreshed and cheerful, he may be tolerably sure that his diet is well regulated, and that he has not exceeded, in eating or drinking, the bounds of temperance.

Glycerine (glis'er-in). This is a colorless, viscid, neutral, uncrystallizable, inodorous fluid, of a sweet taste, is soluble in water and alcohol in all proportions, but is nearly insoluble in ether. It is a product of the saponification of the various fats at one time regarded as refuse. The uses of glycerine are numerous. In medicine it is used as a local application in diseases of the skin and ear, and it is used internally as a solvent for many drugs. It is a valuable preservative for small and delicate preparations, and it has been applied to the preservation of meat. As a household article glycerine is valuable for many uses. Applied to the skin it has a softening and healing effect, and is probably the best application known for chapped hands. In cases of wounds, sores, bruises, burns, etc., it is always a handy and effectual antidote. In surgical cases it reduces the secretion of pus, and never adheres to the surface of the wound, which, until the period of cicatrization, is always clean, and therefore does not require washing. In burns, deep abscesses, fistulous passages and ulcerations, glycerine, combined with appropriate medication, assists the internal treatment very remarkably. It has been found serviceable in itch affections. A good preparation for the skin is a mixture of glycerine and collodion, which is supple and adheres closely to the surface.

Glycerine enters into the manufacture of soaps, ointments, balsam, composition for leather, copying ink, lotions, the preservation of fruit, and into other uses, several of which are mentioned in connection with other subjects in this volume.

Glyster: same as Clyster.

Gnats. The best preventive against these annoying little flies is said to be rubbing spirits of camphor over the face and hands; it is also a cure for their bites and stings.

Goad, a pointed instrument formerly used, especially in the East, for driving oxen.

Goat, a genus of quadrupeds of the order Ruminantia. It is nearly allied to the genus of antelopes on the one hand, and genus of sheep on the other, so that it is difficult to define the distinction between them, though the common domestic goat and sheep are of widely different appearance. A marked distinction is that the horns of the goat are directed upward, backward and outward, while those of the sheep are more or less spirally twisted. Another characteristic is the beard on the chin of the male goat, which is wanting in the sheep. A constant character is the straight line of the face in goats, and the tail of goats is much shorter than that of sheep; another the want of a small bit of fatty secretion between the toe which is found in sheep; another, the strong smell of male goats; and also the difference of the goat from the sheep in temper. The horns and beards of female goats are always smaller than those of the male. Goats are found wild in mountainous countries. The Rocky Mountain Goat or Antelope is a specimen of the wild variety. The Syrian Goat, the Cashmere and the Angora Goats are all noted for the length and fineness of their hair. Great variation in the quantity and quality of the hair results from difference in climate.

The wild species of goat inhabit mountains, near the limits of perpetual snow; and even such of the domesticated varieties as live in mountainous districts continue to climb while grazing, till thirst or the love of home recalls them to the valley. All goats leap with precision on very difficult ground, and love to look over precipices, and to climb to the summits of beetling crags and lofty pinnacles; and when two meet on such a narrow ledge of rock as will not admit of their passing each other, the one lies down and the other walks over its back. They are always in motion, ever in search of new objects, constantly fermenting with insatiable curiosity; and though not disinclined to associate with the animals of the farm or with man himself, they are unsteady in their feelings, and continually prone to break bounds and wander. They are acute in sensation, and far-sighted in vision, keen and delicate in the sense of smell, and wayward, audacious and fearless in disposition, and when grazing or passing from place to place in company with sheep, they always take the lead and allow the sheep to follow. None of the species are large in stature, but their structure is robust and their habits vigilant. The chase of them is, therefore, both laborious and dangerous; for every strange object is seen at a great distance, and if suspicious, avoided by a retreat, which defies the skill and industry even of the most intrepid hunter, and often causes his life to be sacrificed by the dangers of the precipices, the ice, or the animal, driven to despair, bolting down upon him, and plunging both headlong into the abyss. The wild species can mount a perpendicular surface, 15 feet high, at three leaps, or rather three successive bounds of five feet each, if the slightest rugosity will suffer the renewals of impending force, while the original impulse is still sufficient to retain the given direction. Between two perpendicular rocks, close together, they mount by alternate bounds from one to the other. In cases of fear, their voice is a short, sharp whistle, stronger than the chamois; at other times it is a snort; when threatening, it is a broken, spluttering sound, and when young they bleat. The females are attentive and affectionate to their young, and will defend them against wolves and eagles. Goats readily find sustenance in situations where bovine animals, or even sheep, would starve, and are so extremely course in their tastes and indiscriminate in their digestion that they will feed on plants, such as the cowbanes and the spurges, which are noxious to other animals, on the buds and bark of shrubs and trees, and even on such nauseous and narcotic stuff as manufactured tobacco.

Goats and sheep seem to have been among the last of the geological series of animals which appeared upon earth, so as to have preceded by but a link or two the creation of man. Any remains of them which have been found, like the remains of man himself, occur in such perfectly recent deposits, or in such strictly superficial situations, as to prevent them from being regarded, in any ordinary sense of the word, as fossils. Yet though no fossil goats or sheep have anywhere been found, living goats occur, in a wild state, in three, or perhaps four, of the great divisions of the globe, and living sheep occur, in a wild state, in almost every great portion of the world, with the exception, perhaps, of Australia.

The different kinds of domesticated goats, though exceedingly numerous, and diffused over the greater part of the world, and diversified by the influence of different climates and the pastoral usages of different countries, are easily reducible to a single species. But the different kinds of wild goats, though far fewer in number, and not at all affected by artificial circumstances, exhibit very wide diversities, and require to be distributed into several species. Linnæus regards the domestic goat as an original or underived species; but the vast majority of naturalists, though widely disagreeing among themselves in some important particulars, regard it as a modification of some one or other of the existing species of wild goats.

The domesticated goat, in almost any of its varieties, but especially in the best and most common of them, is an animal of great utility to men, and, if properly treated, would in bleak, bare, mountainous districts be more valuable than even the sheep. Its skin, with the hair on, was probably an extensive and long-continued article of clothing among the ancients, and is still so used by some of the peasantry of the Scottish Highlands, and by many of the inhabitants of Brittany and Normandy. Its skin, in a dressed state, particularly the skin of the kid or young goat, is of great importance in the present day to glove-makers, and is said to be more susceptible of dyes than any other kind of skin. The horns are good material for knife handles. The hair of the woolly and silky-fleeced varieties is a material of great mercantile value for the manufacture of shawls and similar fabrics. But even goat-hair, in general, is of much worth. It was anciently combined with the short fur of other animals, and with vegetable gum or animal glue, for the manufacture of a solid kind of felt which was very long and extensively used in Northern Asia; and it formed a chief material of several sorts of fabrics for wearing apparel in some of the Roman provinces before the time of Constantine and among the Scandinavian tribes of the middle ages. The domestic goat in the north and west of the old world preceded sheep for many ages, and predominated while the country was chiefly covered with forests; nor is there evidence of a wool-bearing animal crossing the Rhine or the Upper Danube till towards the subversion of the Roman Empire. The hair of the haunches, where it is usually thicker and longer than elsewhere, brought a high price from perruquiers in the days of general wig-wearing, and is still used for making the wigs of barristers, judges, and other wigged dignitaries of Great Britain.

The flesh of the goat, and particularly that of the kid, was formerly in great and general request as an article of food, but is at present very generally disliked. The flesh of the adult goat, especially of one somewhat advanced in age, is tough and strong-tasted, yet does very well to be salted and made into bacon, and is so treated in Wales. The haunches of the goat, says Pennant, "are frequently salted and dried, and supply all the uses of bacon; this, by the natives, is called Coch yr wden, or hung venison. The meat of a castrated goat that is six or seven years old, which is called hyfr, is reckoned the best, being generally very sweet and fat. This makes an excellent pastry; goes under the name of rock venison, and is little inferior to that of the deer." The flesh of the kid is so tender and well-flavored as not to be surpassed by that of the best lamb, and is as nourishing as it is delicate. Nothing, therefore, but culpable ignorance or absurd prejudice prevents as brisk a demand for goat's flesh in the markets of mountainous districts as for the flesh of sheep and lambs in the shambles of low and extensive plains.

The suet of the goat is said to make whiter, and in all respects better, candles than that of the sheep or the ox. The milk of the she-goat is light, rich and nourishing; it possesses qualities intermediate between that of the cow and that of the ass, being more serous than the former and less so than the latter; it curdles easily, and makes a very palatable cheese; it has been long extolled as has also been its whey, for its medicinal virtues, and it has yielded freely to the hand in comparatively large quantities and during a comparatively long time.

Goats do well to be confined in yards as pets for children, and form fine subjects for the exercise of the care and the gentleness which all young people, especially in country situations, ought early to acquire for every kind of domestic animal. Goats do well, also, to be tethered to limited spots by the wayside, on patches of waste ground, or in the corners of fields or paddocks to feed upon coarse herbage or redundant grasses for the sake of yielding milk for invalids. But, in almost any other circumstances, they are ill-adapted or not adapted at all to low, enclosed, and well cultivated districts; for besides being far less profitable in such situations than sheep, they overleap fences, browse upon the twigs of hedges, and constantly do considerable damage by their peculiar tastes and habits. In mountainous districts, however, they are of great value, and ought to be in very extensive request. Goats can feed well where sheep would almost or altogether starve, and in many bare, bleak and rocky regions. The domestic goat, like the wild one, thrives on many a plant which would disgust and perhaps kill other domestic animals; and, like the wild one, too, it easily climbs to the least accessible and the most unpromising acclivities of rocky mountains in search of food.

The goat is but little used in American agriculture. It is often kept about livery stables because it is thought that its peculiar odor has a tendency to prevent disease.

Goiter, a scrofulous enlargement of the thyroid glands at the throat. Take two drachms iodine and one ounce iodide of potassium, to be taken in ten-drop doses each morning before eating. Once a day rub the neck with iodine. The ugly stain may be avoided by putting the iodine into a mortar and pouring in oil of juniper until the mixture will not stain the finger. It does not impair the strength or peculiar properties of the iodine in the least. Rubbing persisted in for months, a few minutes two or three times a day, will generally scatter tumors of this kind.

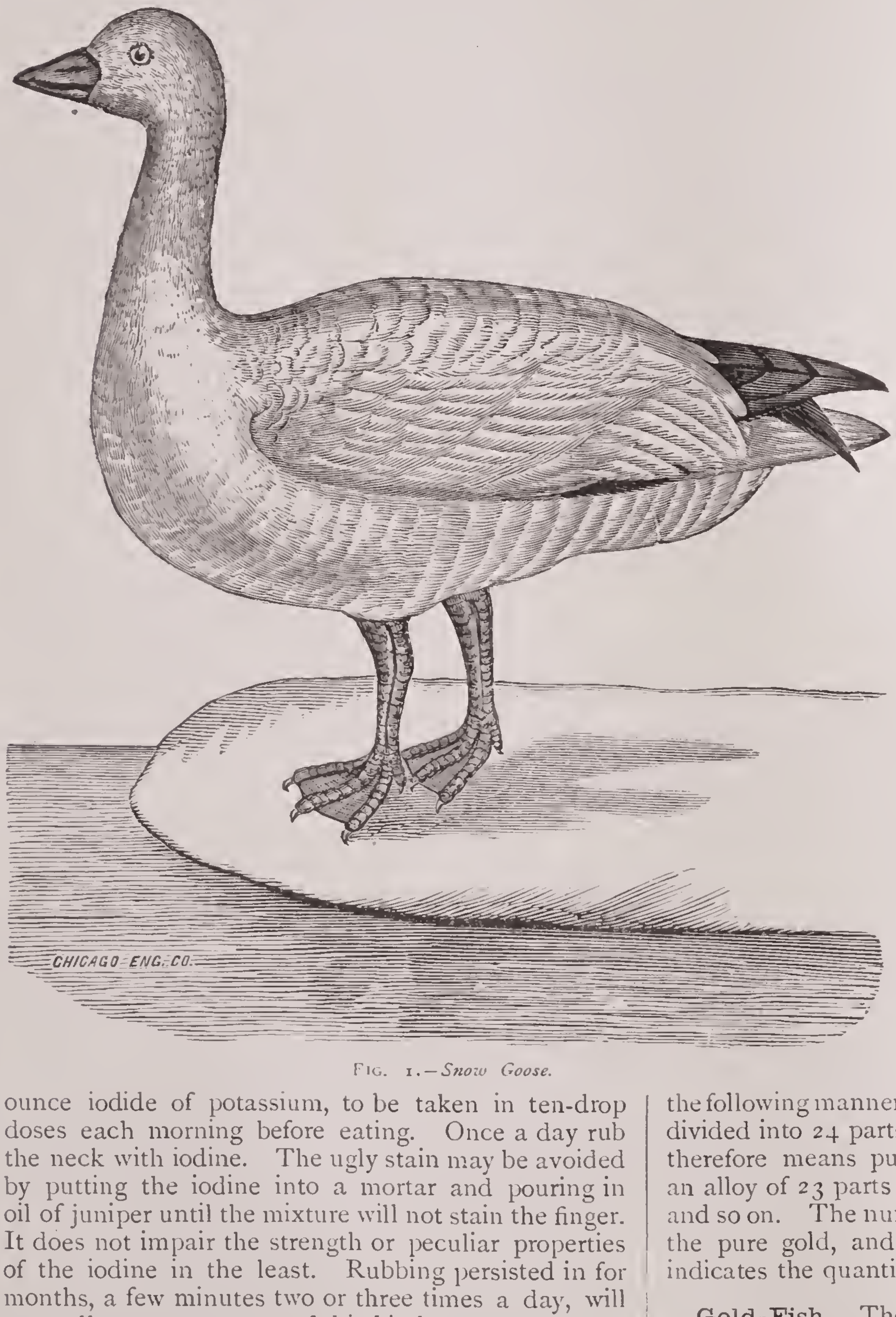
CHICAGO ENG. CO.

Fig. 1.—*Snow Goose.*

Gold. Gold is valuable, not only on account of its scarcity, which renders it very useful as a medium of exchange, but it possesses some peculiar properties which render it preferable to every other metal for particular purposes. Its great malleability is exemplified in the making of gold leaf, so much employed in gilding. Its ductility and tenacity are shown by the drawing of gold and gilt silver wire, and in gold lace and embroidery. Its softness renders it easy to be worked into various delicate forms for ornaments, for which its beautiful rich color and resplendent luster, which are different from those of any other metal, peculiarly qualify it; and its perfect unalterability, when exposed to the air or fire, has justly stamped its high character in all ages. Its specific gravity is greater than any metal except platinum. Its hardness is greater than that of lead and tin, but inferior to iron, copper, platinum and silver. It cannot be dissolved by any acid except the nitro-muriatic, formerly called aqua regia, and which is a mixture of the nitric and muriatic acids; neither of these acids, separately, can dissolve it; and it is precipitated from its solution in the state of gold powder by an alkali. It forms alloys with most of the metals. These properties render it invaluable for many economical purposes, which are well known; and its never tarnishing, if pure, when exposed to the air, occasions it to be so much used in gilding, on both wood and metal.

Gold Coin may always be proved if any counterfeit be suspected, by its great gravity of 17.157. Pure gold has a specific gravity of 19.3; the reduced weight of the coin is due to the alloy. Aqua regia is the solvent of gold.

How the Value of Gold is Estimated. Goldsmiths usually indicate the purity of gold in the following manner: Perfectly pure gold they suppose divided into 24 parts called carats. Gold of 24 carats therefore means pure gold; gold of 23 carats means an alloy of 23 parts gold and one of some other metal, and so on. The number of carats mentioned indicate the pure gold, and what that number wants to 24, indicates the quantity of alloy.

Gold-Fish. These should be kept in a vessel of such capacity as will allow of at least two gallons of water to each fish, and the water, if of this minimum quantity, should be renewed every day or two. In renewing, clean the vessel inside with a cloth. The water supplied should be clean and not very hard. These fish need not be fed, as they obtain all the sustenance they need from the water and air. Substances thrown into the water as food only deteriorates that element for their existence. Fresh leaves and growing water plants have a good effect upon the health of the fish.

Goose. The goose belongs to the same family as the duck, but is classed with the genera Anser and Bernicla. The goose, although not mentioned in the Bible, was known by the ancient Egyptians, and other ancient nations. Although apparently a stupid bird, it is aroused by the slightest noise in the night, and the immediate cackling which they begin upon the approach of apprehended danger, is considered as a valuable safeguard. It was held sacred by the Romans on this account, it having alarmed the sentinels of the capitol at the invasion of the Gauls, and thus saved the city.

There are many wild varieties of the goose which make their regular visits to the United States, coming from the Arctic seas and Hudson Bay region. Of these we will treat first, after which the domestic varieties, their care, management, etc.

WILD GEESE. No less than eight well determined species of wild geese inhabit North America; besides these there are four varieties, so that the list of our geese in all include about a dozen fowls.

Barnacle Goose. Some claim that this goose is found on the northeastern coast of the United States, while others think the specimens killed were the White-fronted Goose which, being rare in the East, might have been mistaken for the Barnacle. It is plentiful on the Western coast of England and North of Ireland. It is a very wild kind and difficult to approach by any means. Audubon says it breeds in Ireland, Spitzbergen, Greenland and Lapland. We give an excellent specimen of this bird on this page.

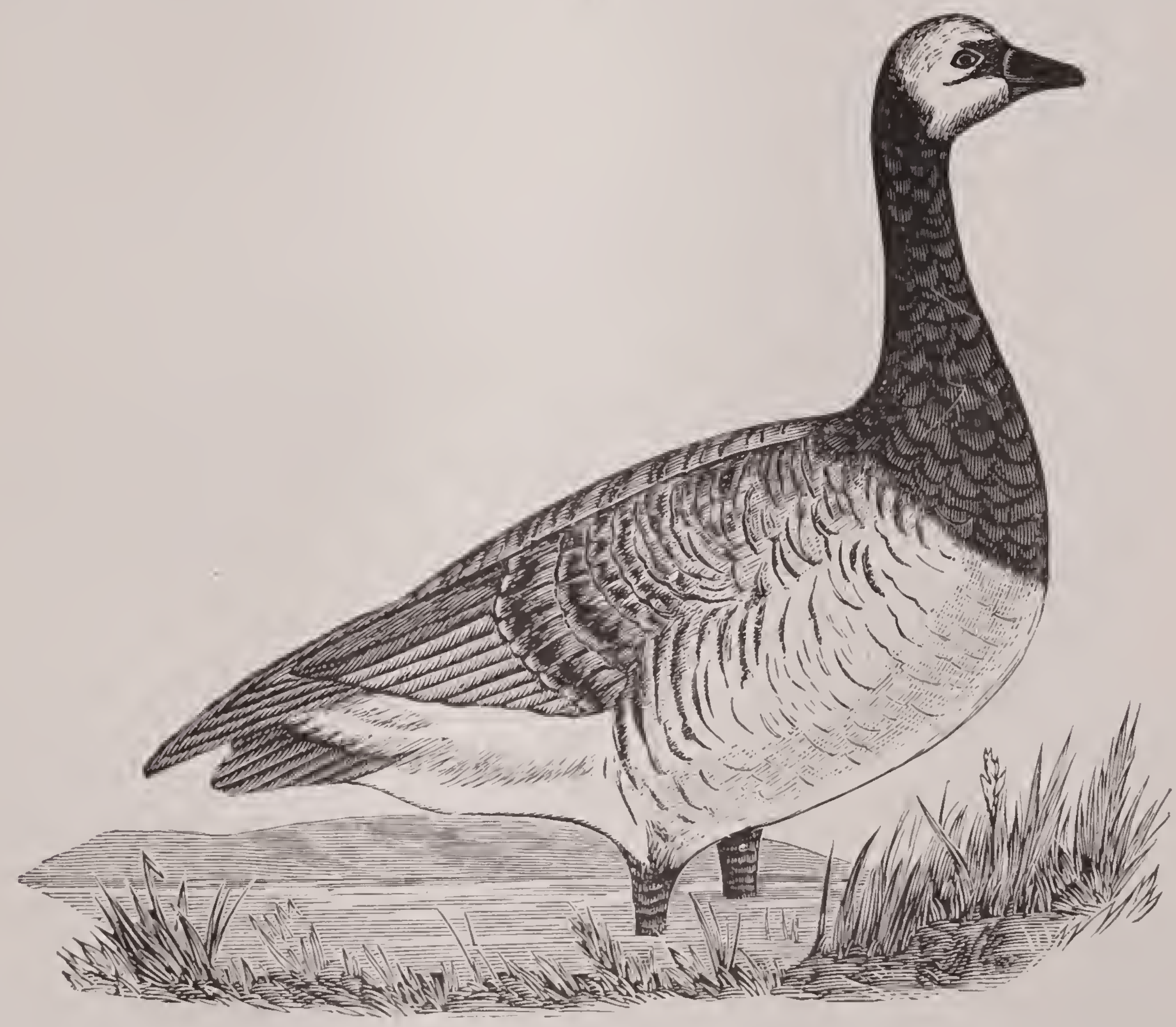

FIG. 2.—*The Barnacle Goose.*

Bean Goose. This species has its home in the north frigid zone, but occasionally wanders as far south as the Lake region. Its beak is rather slender and pointed, its color black with an orange center, the head and upper parts brownish gray, the primaries of a darker hue, both tail coverts are white, the throat and breast are grayish white, and the abdomen pure white. The total length of the bird is about 34 inches. It is most nearly allied to the Barnacle Goose, and is thought by some to be a mere variety of that species. See engraving, page 581.

Brant Goose. The Brant Goose is common on the eastern coast of the United States, and in very severe winters extends its migrations as far south as the Currituck region, stopping on its journey, and in open winters remaining in the several sounds and bays on the Long Island and New Jersey coasts until spring. According to the severity and mildness of the season, so are their numbers increased and decreased north and south on the Atlantic seaboard to the Carolinas. The common Brant is not known in the West, notwithstanding every bird of the goose family but the Canadian goose is sometimes called Brant by sportsmen of that section of the United States. The misnamed Brant of the West is the White-fronted Goose, on this page. The Brant Goose is strictly a salt-water bird, never going inland, and seldom, if ever, crossing headlands or projections of land in their course. They breed in the far North, Audubon states, on the coasts of Hudson Bay and the Artic sea, and begin their journey south in the autumn, from the middle to the last of October. The methods of capturing the Brant are precisely similar to those employed with its more important relative, the Canada Goose.

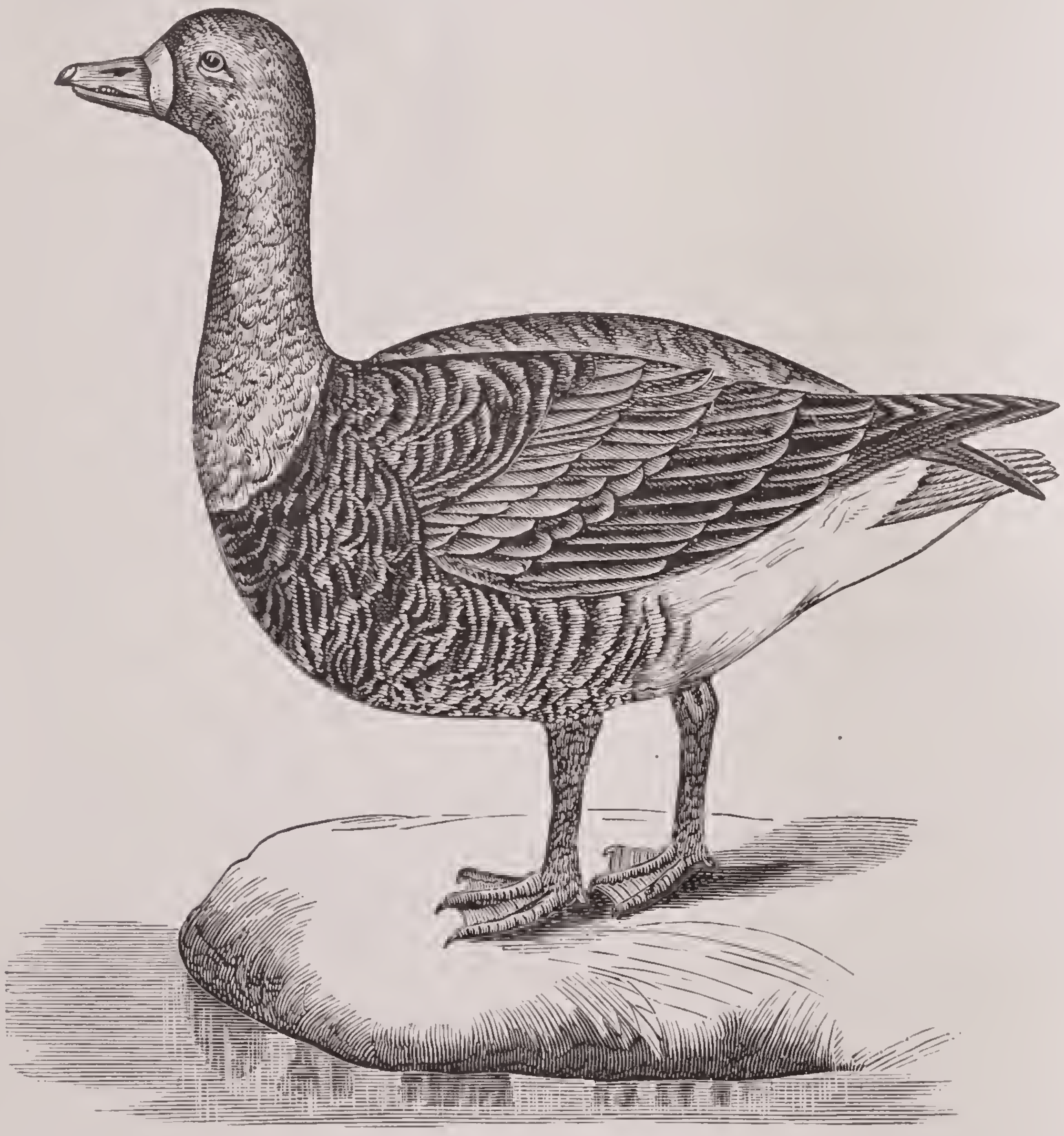

Fig.3.—*White-fronted Goose.*

Canada Goose, or *Common Wild Goose*. This is by far the most abundant and universally distributed of the North American geese. In one or another of its varieties it is found in all the States and Territories except, perhaps, the Gulf States. It is the most common wild goose in the United States; like the Gray Lag, as it is known in Europe, it is termed by the common appellation of "Wild Goose" in this country. It is familiar to all sportsmen, and easily recognized from its curious habits of flight and peculiar cry ("honk, honk"). This sound often comes upon the ear at night, when the flock is invisible, and it is frequently heard even in the day-time, seeming to come form the sky, the birds being beyond the reach of vision. They make their annual flights in their regular battalion-like progress to and from their breeding places. Their spring migrations usually take place from the 20th of March to the last of April but are wholly dependent upon the state of the season. They linger in the North, where they breed, until the hard frosts warn them that the lakes and streams will soon be frozen over. Wilson was of the opinion that the range of the Canada Goose "extends to the utmost polar point, amid the silent desolations of unknown countries, shut out from the prying eye of man by everlasting and inseparable barriers of ice." In size the Wild Goose is 35 inches long, and the wing 18 inches. The upper parts are a brownish color, the lower parts lighter, while the head, neck, bill and feet are black. In a state of domestication the female does not breed until two years old. The gander will mate with the common goose, but their young will not breed.

Hutchins' Goose. Dr. Richardson, in his valuable work on ornithology, tells us that the Hutchins' Goose was for a long time taken for the Brant, or an emaciated Canada Goose. Its resemblance to the latter is so great that, were it not for its decreased size and the more distinct barred markings on its breast and belly, the two would be identical. The Hutchins' Goose is abundant in Hudson Bay, and on the Pacific coast as far south as California; and the lakes of all the Western Territories at times throng with them. A good engraving of this species is given on page 580.

Snow or *Arctic Goose*, or *White Brant*, is plentifully distributed throughout the greater portion of the

United States; but of late years its principal range is in the West and Southwest, from Texas northward. Audubon saw it in great numbers in the Gulf of Mexico, and in its gray plumage on the lower Mississippi. Until the Snow Goose reaches two years (some writers say three), its plumage is an ashy-gray or sooty-white. In the West this bird is frequently called the White Brant, and sometimes confounded with the White-fronted Goose. The excellent engraving of this goose (shown on page 576) very clearly shows its build and shape, and scarcely needs further description.

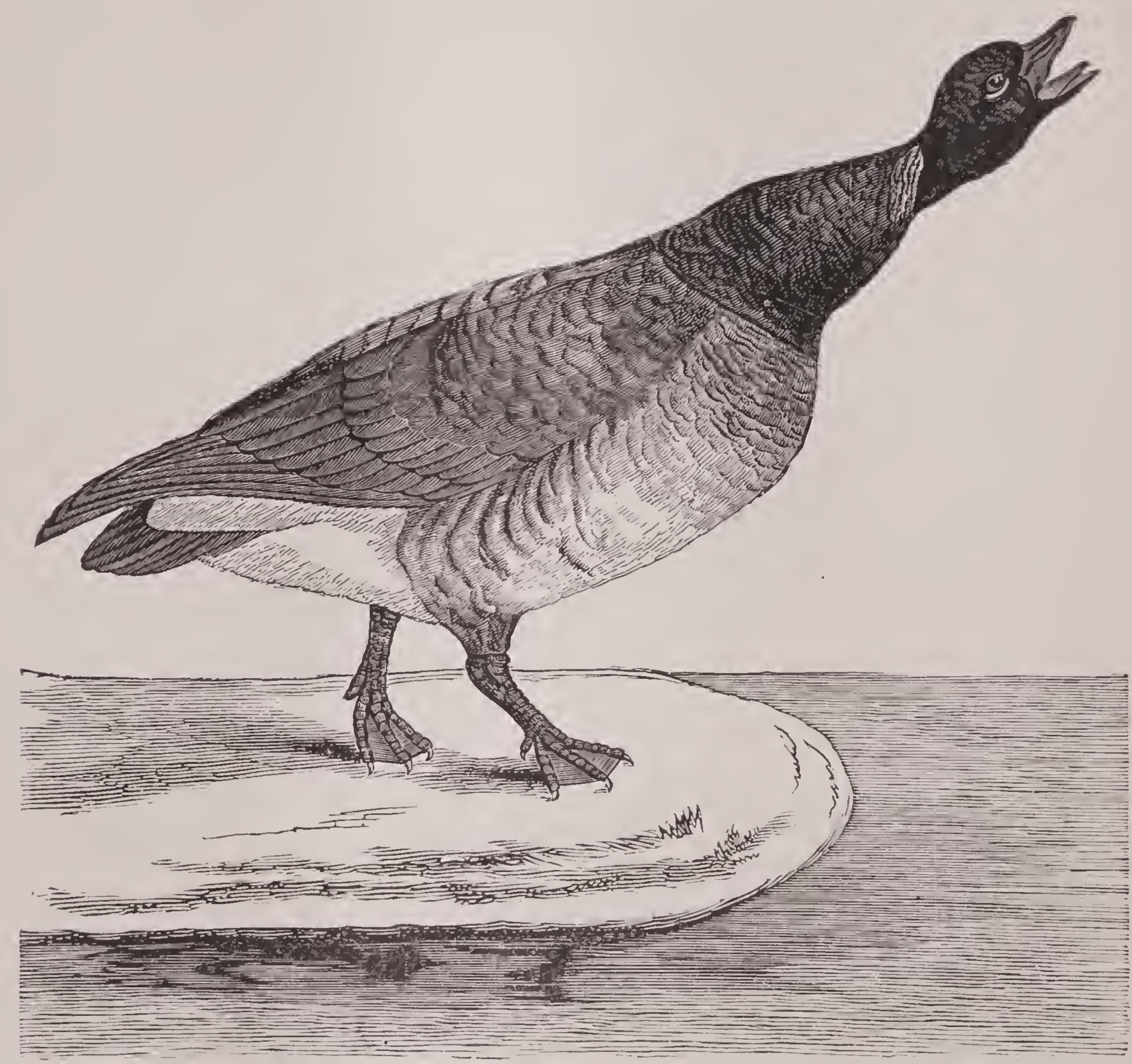

Fig. 4.—*Brant.*

White-fronted Goose, Speckled Belly. In the West this bird is very abundant, coming in advance of the Canada Goose, and leaving ten days or two weeks earlier. Dr. Richardson says they breed in the Mackenzie river region and in the Arctic seas. They are called Brant in the West by many, thus confounding them with the real Brant (*Anser Bernicla*). By some they are termed the Laughing Goose, on account of the grinning appearance of their bill, the space between the upper and lower mandible being wide apart and displaying a corrugated ridge resembling teeth. The range of the White-fronted Goose is entirely westward in the United States, being very rare in the East. The measure of an adult bird in its winter plumage, as taken from a specimen in the Philadelphia Academy of Sciences, is as follows: Length to end of tail, 27 inches; to end of wing, 26 inches; to end of claw, 29; extent of wings, 60; wing from flexure, 14½; tail, 4¾; bill, 1¾; weight, 5½ pounds. When domesticated it belongs to the class of birds which are restrained from resuming their original wild habits more by the influence of local and personal attachment than from any love which they seem to have for the comforts of domestication. They may be trusted with their entire liberty, or nearly so, but require an eye to be kept on them from time to time lest they stray away and assume an independent and wild condition.

The first impression of every one, upon seeing this species in confinement, would be that it could not be trusted with liberty; and the sight of its exercising its wings at its first escape would make its owner despair of recovering it. This is not, however, the case. By no great amount of care and attention, they will manifest such a degree of confidence and attachment as to remove all hesitation as to the future; and they may be regarded as patterns of all that is valuable in Anserine nature,—gentle, affectionate, cheerful, hardy, useful and self-dependent. The gander is an attentive parent, but not a faithful spouse. The eggs are smaller than those of the common goose, pure white, and of a very long oval; the shell is also thinner than in most others; the flesh is excellent. For a fine picture of this goose, see page 578.

Besides these breeds of wild geese there is the Ross Goose, the Blue Goose, or Bald-headed Brant, and Emperor Goose, all of which, however, are seldom met with in the United States save the Blue Goose. See page 582. It is found during the migratory season distributed over the West in company with the Snow Goose and the White-fronted Goose. All wild geese are captured similarly, and the explicit directions given in the article Guns and Gunning will apply equally well to all wild geese.

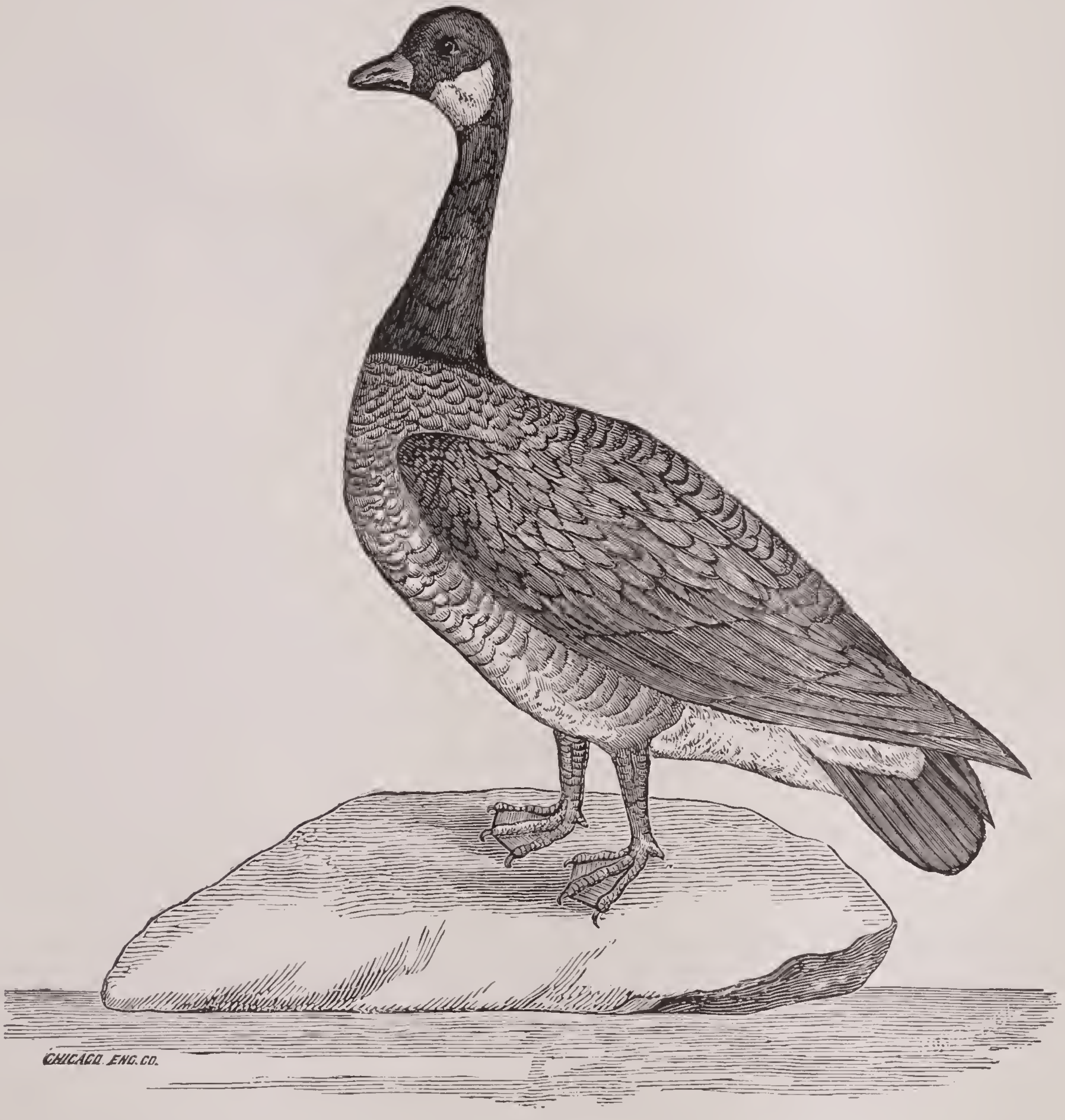
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Fig. 5.—*Hutchins' Goose.*

Domestic Varieties. Of the eight sub-varieties of the goose family supposed to have descended from three distinct wild species, the common Gray, or White

Goose, the Bremen, or Embden, and the Toulouse, are supposed by some to have come from the Gray-legged goose still found wild in the North of Europe. Others consider the domestic species a mongrel, like the dunghill fowl, made up of several varieties, to each of which it occasionally shows more or less affinity, and yet others contend that it is not to be referred to any existing species.

The domestic gander is polygamous, but he will seldom couple with females of any other species. Hybrid common geese are almost always produced by the union of a wild gander with a domestic goose, and not by the opposite.

Bremen. Is a large, pure white goose, with brick-red legs and bill, first brought to this country from Bremen, in Holland. In England, they are called Embden, from a town of the same name in Holland, where theirs were first obtained. They are said to be exclusively bred in Germany and Russia, and probably Austria. These geese are very large, weighing from twenty-two to twenty-six pounds, live weight, and occasionally full thirty pounds when in high flesh, as seen in exhibitions; and though so large, they are well proportioned, hardy, healthful, and very showy. They are quiet and peaceable, and take on flesh very rapidly with extra feed. They also supply a superior quality of feathers in very large quantity. The female lays about the same number of eggs as the common goose, but usually commences much earlier in the spring. A cut of this goose is given on page 583.

Chinese Geese. As an ornamental and useful variety of aquatic fowls, the Brown or White China Geese would be much better for the breeder than the common kind. They are of all the Anser tribe the most prolific layers. They commence early in the spring and lay from twenty to twenty-five eggs without stopping, and if broken up in their inclination to sit, will lay again and again. They breed three or four times in a season if allowed, and are careful and vigilant mothers. Their eggs are not more than half the size of those of the common goose, but they more than make up for deficiency of size by laying almost thrice the number of the larger breeds. In color this variety is mostly brown, shading from dark to light. The neck has a dark stripe down to the body, the under parts grayish brown and darker under the wings, and the legs are of a dusky orange color. One peculiarity of the China goose is a knob at the base of the bill. They are more swan-like in shape and carriage than any known variety.

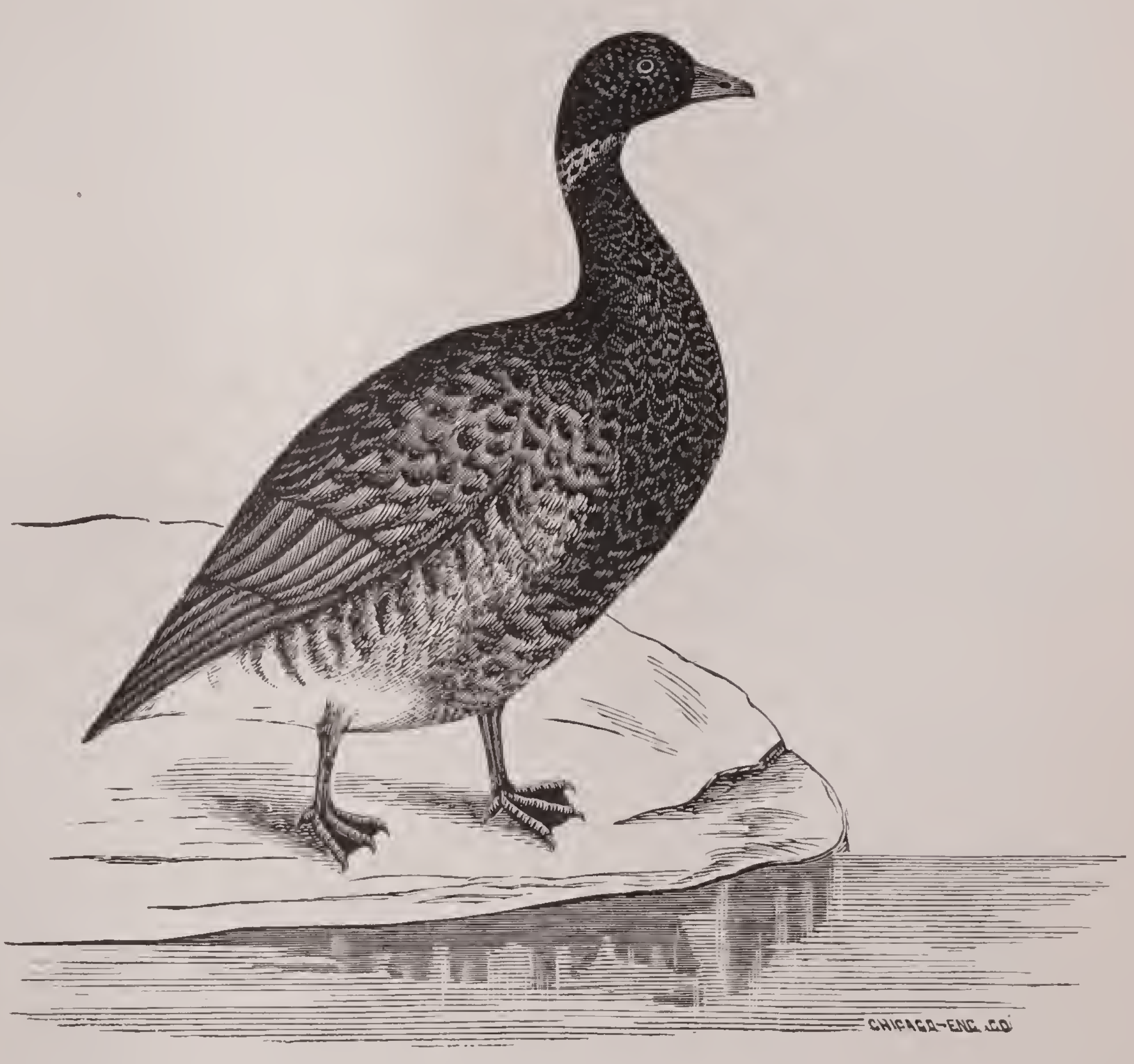
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Fig. 6.—*Bean Goose.*

Hong Kong or African. Is colored the same as the Brown Chinas, with bills, knob and legs a dull black, while in size it has no superior. It is also distinguished by a large fold of loose skin under the throat, called the dew-lap, that increases with age.

Toulouse. Was brought to this country from the South of France. It is distinguished from the common gray goose by the uniformity and constancy of its color, which is alike in both sexes, and darker than in the common goose, and by its very large size, being as heavy as the best bred Bremen. They are rather short-legged, have round, compact bodies, and a large development of the abdominal pouch, which, in the common goose, is a mark of considerable age, but commences its appearance in this variety when but a few months old. Like the Bremen, they lay early in the spring, are very quiet, fatten readily, and have excellent flesh. Our common geese cross freely with the Bremen and Toulouse, the first cross yielding birds nearly or quite as large as either parent; but the results of the cross rapidly degenerate by breeding among themselves. To keep up the size the cross birds should be bred to one of the larger geese. The cross between the Bremen and the Toulouse is even larger than either parent, but deteriorates by breeding-in. The time of incubation by this variety is from twenty-eight to thirty days. See cut, page 583.

Care and Management. Generally not more than four or five geese should be allowed to one gander, to be very profitable, and such a family will require a house about ten feet square. Each nest should be about two feet and a half square. Geese should be set early in the spring, as it is difficult to rear the young in hot weather, and incubation requires about 34 days. They sit very steadily, but they should be induced to come off daily and take a bath. They should also be faithfully supplied with food and water, to keep them from eating up their own eggs. The ganders remain near when sitting, and seem to act the part of a sentinel. They seem very anxious to see the young ones that are to be born make their appearance. It is not necessary to keep the gander away. Incubation lasts from 28 to 30 days. After 28 or 29 days' incubation, begin to clip the shell. This may be done at intervals, however, of from 24 to 48 hours. Like turkey chickens, goslings must be taken from under the mother lest, if feeling the young ones under her, she might perhaps leave the nest of the tardy brood still unhatched. After having separated them from her, they must be kept in a basket lined with wool and covered with cloth, and when the whole of the eggs are hatched, may be returned to the mother. The male seems to evince the same solicitude for the young as the mother, and will lead them and take equal care of them. On the second day after they are hatched, they may be let out after the dew is off, if the weather is warm, but care must be taken not to expose them to the scorching rays of the sun, which might kill them. The goslings should have immediate access to the turf, and be fed on boiled oatmeal and rice, with water from a pond, in a very shallow dish. They should not be allowed to swim for about two weeks, during which time the goose should be kept under a very large crate. Until fledged they should be protected from cold, driving rains. For fattening, they should be penned up half a dozen together in a dark shed, and fed on barley meal, being let out several hours for a last bath before they are killed, in order to clean their feathers.

The liver of a fat goose is often larger than all the other viscera, and was a dish in so great reputation among the epicures of Rome that Pliny thought it deserved a serious discussion to whom the honor of inventing so excellent a dish was due. They fed their geese on figs, to improve their relish, and were not ignorant that they fattened sooner in a dark room; but it was left for modern gastronomers to invent the barbarous method of nailing down their feet and putting out their eyes.

Though greatly relished by some persons as food, it is not a universal favorite. The flesh abounds in flavor, and is considered to be highly stimulant. When young it is tender, but, in general, it is only adapted for good stomachs and powerful digestion, and should be sparingly used by the sedentary and weak, and by persons subject to cutaneous diseases. Its strong flavor is by some thought to require modification by stuffing with sage and onions, though others relish it only when this is not demanded. From the various parts, however, many savory dishes are prepared, for which we refer to the receipts on that subject. The fat is reckoned peculiarly subtle, penetrating and resolvent, and is usually preserved for domestic applications.

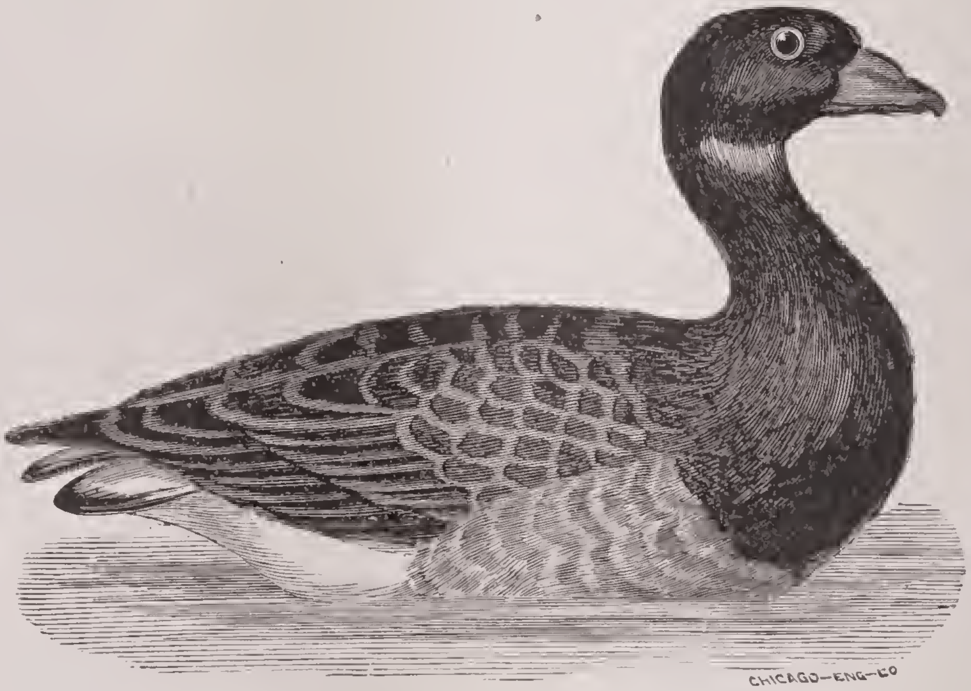


Fig. 7.—*Blue Goose.*

The average weight of the large kind of geese is from nine to fifteen pounds, and instances have been known of their weighing thirty pounds when fully fattened; but the smaller breeds are preferable for the table.

It is not altogether on account of use as food that this bird is valuable; their feathers, their down, and their quills have long been considered as articles of more importance, and from which their owners reap more advantages. In this respect, the poor creatures have not been spared; urged by avarice, their inhuman masters, in some places, appear to have ascertained the exact quantity of plumage of which they can bear to be robbed without being deprived of life.

Diseases. Geese are seldom unhealthy, and consequently are attacked by but few diseases. Cold and fogs are their worst enemies; therefore, when young, care should be taken not to let them out but in fair weather, when they can go to their food without a leader. They are particularly subject to two diseases: the first a looseness or diarrhœa, for which Main recommends hot wine in which the parings of quinces, acorns, or juniper berries are boiled. The second is like a giddiness, which makes them turn round for some time; they then fall down and die, if they are not relieved in time. The remedy recommended by Main is to bleed the bird with a pin or needle, by piercing a rather prominent vein situated under the skin which separates the claws. Another scourge to goslings are little insects which get into their ears and nostrils, which fatigue and exhaust them; they then walk with their wings hanging down, and shaking their heads. The relief proposed is to give them, on their return from the fields, some corn at the bottom of a vessel full of clear water; in order to eat it they are obliged to plunge their heads in the water, which compels the insects to fly and leave their prey. It is the same with the goose, says Main, as with every other bird that is fattened up; that moment must be laid hold of when they come to a complete plumpness, or they soon get lean and die if they are not killed. Meal and skimmed milk will soon do the business; after ranging in the grain stubbles but little else will be required. These are called green geese, and are most esteemed by the epicure; they will then be about six weeks old, tender and fine. Steamed potatoes, with four quarts of ground buckwheat or oats to the bushel mashed up with the potatoes, and given warm, it is said, will render geese, cooped in a dark place, fat enough in three weeks. The French method of fattening consists in plucking the feathers from under the belly; in giving them abundance of food and drink, and in cooping them up more closely than is practiced with common fowls; cleanliness and quiet being, above all, indispensable. The best time is in the month of November, or when the cold weather begins to set in.

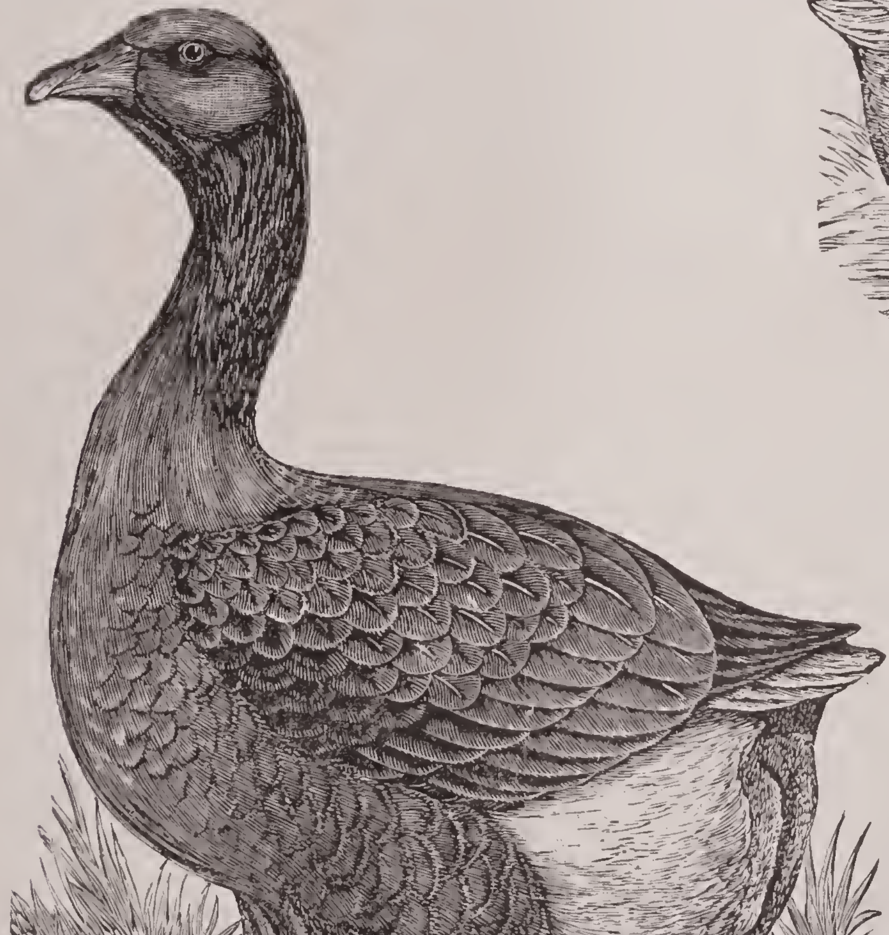


Fig. 8.—*Toulouse.*

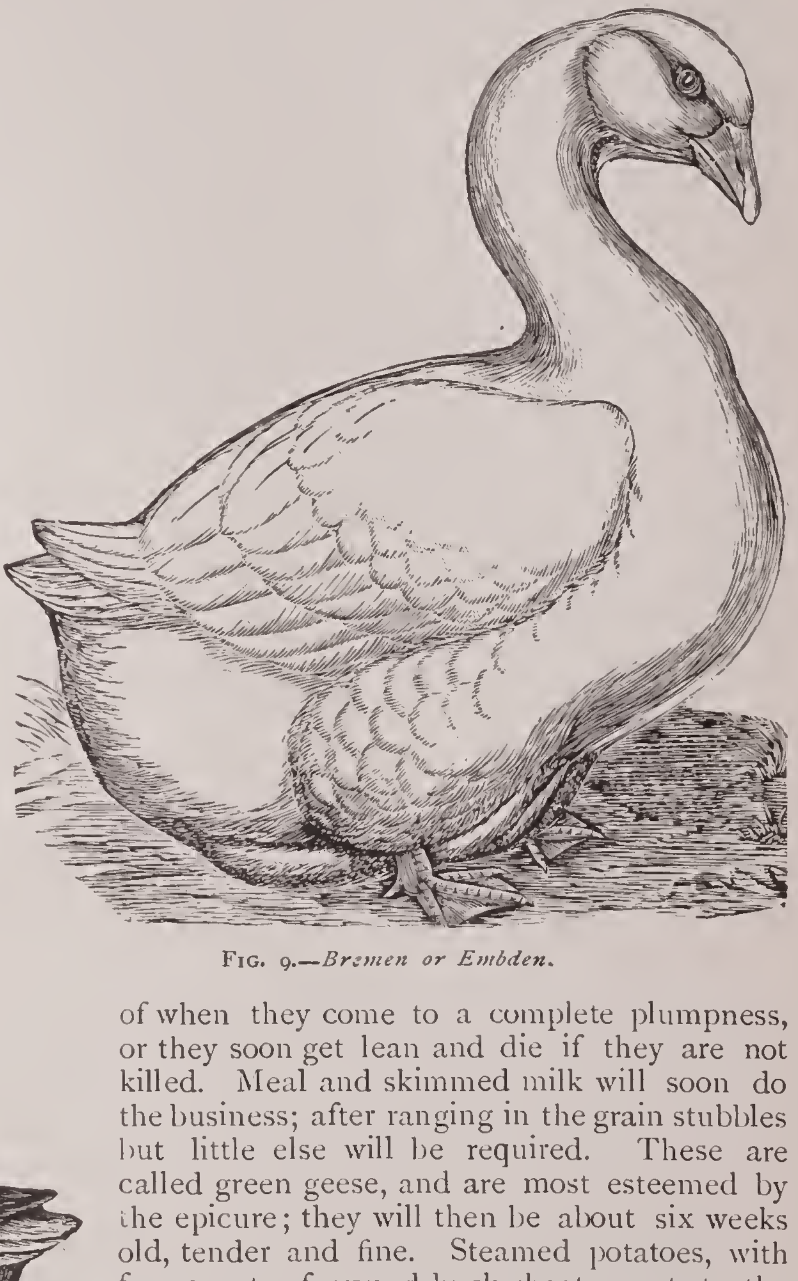


Fig. 9.—*Bremen or Embden.*

Roast Goose and Duck. Boiling water should be poured all over and inside of a goose, or duck, before you prepare them for cooking, to take out the strong, oily taste. Let the fowl be picked clean, and wiped dry with a cloth, inside and out; fill the body and crop with stuffing; if you prefer not to stuff it, put an onion inside; put it down to the fire, and roast it brown. It will take about two hours and a half.

Another: Geese and ducks, if old, are better if parboiled before they are roasted. Put them on in sufficient water to cover them, and simmer about two hours. Make a stuffing with four onions, 1 ounce of green sage, chopped fine, a large cupful of stale bread crumbs, and the same of mashed potatoes, 1 teaspoonful of butter, a little pepper and salt, and 1 unbeaten egg; mix them well together and stuff the body of the goose; then place in the oven and bake about an hour and a half. Serve with apple sauce.

Gooseberry. This fruit is too well known to need any particular description in this place; but the fact that good ripe gooseberries are sweet and luscious is not so well known. This berry is generally picked when green, and for those who like sour fruit it makes a valuable sauce, the greatest objection being the large amount of sugar required in their preparation. They are also good for pies, tarts and puddings, the flavor being liked by everybody, and it being the earliest fruit that can be used.

CULTIVATION. Like the currant, gooseberry plants are propagated only by cuttings. Select the strongest and straightest young shoots of the current season, in the fall, cut out all the buds from that portion which is to go into the ground, to prevent suckering, and plant these cuttings in a deep, rich soil on the north side of a fence or hill, or in some shaded border. They should be inserted in the ground about six inches deep, and from three to six inches should remain above the ground; press the soil firmly about them, and cover with a mulch of coarse manure, to be taken away the following spring; at that time examine them, and if any are found raised by the freezing press the earth again firmly around them. The ensuing fall they should be well rooted and ready to transplant to their permanent situation, which should be a sunny place.

The gooseberry in our climate is very impatient of drouth, and therefore the best soil for it is a deep, strong loam, which should, like the ground for currants, be heavily manured and mulched from year to year. To raise good fruit regular and liberal pruning is absolutely necessary; no sucker should be allowed to grow; the branches should be thinned out every winter, an effort being made at the same time to preserve the fine outline of the bush. In the usual shrub form, with horse-and-plow cultivation, etc., these plants will bear profitable crops for many years; but in the tree form, where but one stem is allowed to grow in a place, they will begin to decline in about five or six years. With this plant, as well as with all other fruit trees, the thoughtful gardener will keep up a succession of young plants by striking some cuttings every season.

As to the distance from one another at which they should be planted, there is a wide difference of opinion, some advising that they should be very thick in the rows about eight feet apart, and others thinking that they should be about four feet apart in the row and the rows about five or six feet apart. The former method is said to prevent mildew to some extent, especially if but very little trimming is done. Of course, all old wood should be kept cut out. Give clean cultivation, and for mulching wood and coal ashes are very good to mix in with the other material.

VARIETIES. Not many English varieties of the gooseberry are recommended for cultivation in the northern portion of the United States, as they are very liable to mildew; but where they are not so liable, the Crown Bob, Roaring Lion, Red Champagne and Whitesmith are recommended as the best. These should be severely pruned, and both branches and fruit patiently thinned out. For many years the Houghton Seedling has been the most popular variety.

American Seedling, *American Cluster*, *Pale Red*, *etc.* Bush more upright than Houghton, very productive, hardy, exempt from mildew; wood slender; fruit small to medium and when fully ripe is darker in color than the Houghton; hangs a long time upon the bush; flesh tender, sweet and very good.

Charles Downing. An upright, vigorous growing variety and very productive; exempt from mildew and disease; wood stout and heavy, and thorny; foliage abundant; fruit somewhat larger than Houghton, whitish green with the rib veins distinct, and hangs on until severe freezing weather; it is probably one of the best varieties for the latitude of Iowa.

Houghton's Seedling. This is still the king of gooseberries for the West, as it has been for many years. It is a vigorous grower; branches rather slender and drooping; very productive and not subject to mildew; fruit medium size or below, inclining to oval, smooth, pale red, tender and sweet. Dried by artificial heat it is excellent for puddings and pies.

Mountain Seedling. A good market sort. The bush grows tall and straggling and bears abundantly very large and small berries, which are sweet, a dark brownish red with a long stem and tough skin, and disposed to hang long on the bush.

Smith's Improved. This plant is more upright and vigorous than its parent, the Houghton seedling; the fruit is larger and somewhat oval, light green, with thin skin, a bloom and an excellent flavor; excellent for cooking and as a dessert. As this variety has a tendency to overbear it should be liberally pruned. For all purposes this variety stands next to the Houghton's Seedling in the West.

Gopher, a species of rat, with cheek pouches, broad, mole-like fore feet, and of a reddish or chestnut brown color. The name has also been given in different localities to several species of ground-squirrel and other burrowing animals. The gopher, west of the Mississippi river, does much damage to field crops; and there is no easy and specific remedy against them known. The best that can be done is to destroy them in all practical ways, with dogs, traps, shooting, etc.

Goulard, a solution of sugar of lead, used for inflammations: so called from the inventor; "Goulard's extract."

Gourd. The gourds, especially the larger kinds, require a season fully as long as that in the Ohio River valley and southern Missouri to attain perfection. The ornamental kinds are apt to grow too large if the ground is too rich.

VARIETIES. *Hercules' Club.* Grows four to six feet in length.

Sugar-Trough. Holds several gallons and will last years as sap vessels.

Dipper, *Double-Bottle and Angora* are also good varieties.

Dish-Cloth. The lining of this gourd is so tough that it can be used as a dish-cloth. It is also called "Bonnet gourd" or "Luffa."

Besides the above there are many fancy varieties.

Gourd-Worm, a worm that infests the liver of sheep; called also the fluke-worm.

Gout, inflammation of the fibrous and ligamentous parts of the joints, first attacking the great toe and then the other toes, the fingers and the larger joints. The disease is the result of "high living," and is far more common in England than in this country. Treatment: In this complaint, a perspiration should be kept up by the use of hot medicines—especially composition and pennyroyal tea, as this will assist nature in expelling the gouty matter. As the seat of the disease is generally in the foot and leg, it should be wrapped in the softest wool, wet in sweet oil, and lightly bandaged. When the fit is over, a dose of tincture of rhubarb should be given. When the disease attacks the head or lungs, measures should be taken to bring it to the feet. For this purpose, let the two feet be bathed in warm water, followed by strong mustard poultices. To prevent any aggravation of the disease, the subject must adopt a radically hygienic or vegetarian diet, and be totally abstemious from all artificial drinks and epicurean dishes.

Governor, of an engine, two swinging globes for maintaining a uniform velocity of the machinery, by proportioning the steam to the work.

Gown, a loose, flowing upper garment,—especially a woman's dress or an official robe; any loose wrapper worn by gentleman within doors.

Grackle, the purple or crow blackbird. It is a great pest to oats and corn. Shooting at them considerably night and morning will drive them away. It is still an open question whether they do more harm than good, as they also destroy many injurious insects. They pass the winter in the South. Sometimes the red-winged blackbird, when young, is mistaken for young grackle, but it is also equally destructive.

Grade Cattle are the descendants of any pure breed crossed with the native or mixed breeds. See Cattle, page 184.

Grafting. This is the process of so fixing a shoot or cion or twig of one plant upon another plant that it will grow, and bear its own fruit. This is the most common method of propagating varieties with their characteristics, the seeds of which, if sown, would produce other and inferior fruit. There are several methods of grafting, some being better for some plants and others for other plants. The most important points to bear in mind are, to apply the inner bark of the stock and of the graft precisely to each other, and to bind them firmly in that position. The great advantage obtained by grafting, is that of being able to appropriate the entire vigor of an old established plant to the single piece of wood which is attached to it by grafting; and whether this be in the ground or in pots, or whatever be the nature of the subject, there is no other means by which the object can be effected, unless it be by budding, which, after all is said and done, is but a branch of the same operation; the difference being, that whereas by grafting we attach a piece of wood, with perhaps several eyes, by budding we cut out each eye with a small piece of bark, and by cutting a slit in the bark of the stock, and raising it on each side, we are enabled to tuck in the small piece with the eye to it, and bind it there. In this case the operation of tucking the one bark under the other is facilitated by making a cross cut. It is obvious that every eye on a new variety can thus be made into a plant, and the whole vigor of the stock, as in the case of grafting the other way, is thrown into the growth of the new variety. This practice is more adapted in some subjects than others. Roses are nearly all propagated by budding; and those who wish to form a collection cannot do better than provide themselves with briers and bud them in mid-summer, or thereabouts, with all the varieties they require. See the article Budding, page 125.

WHIP OR TONGUE GRAFTING. This is most generally practiced when the stock and cion are nearly of an equal size. The point is in so forming the graft and stock that the sap and bark of each will meet the other perfectly; or, if either be too large, the bark will match on one side. The tongue is a notch cut in the stock corresponding with one cut in the cion, each having a lip, as it were, to meet the other, and when put together, serve as a support in steadying the graft until they are united in growth. (Fig. 1, second and third examples.) This system is largely practiced by nurserymen in the propagation of the apple, and, being done upon the roots of the stock, is called root grafting. The work can be done in mid-winter, the roots being kept in moist sand all winter, and cions being taken from the tree late in the fall or any time during the winter when they are not frozen, and kept in the same manner. Grafting can of course be done upon stocks in the open ground in spring, or

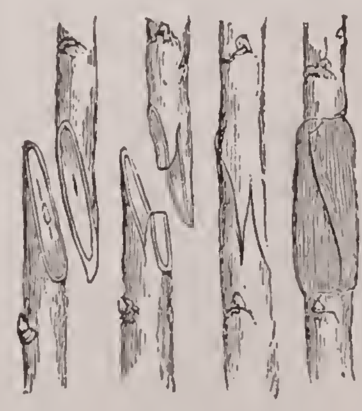


FIG. 1.—*Splice and Tongue Grafting.*

upon limbs of trees in early spring. The latter is called "top-grafting," and is often resorted to in renewing old trees, or in introducing new varieties.

Splice Grafting. This is simply binding together the smoothly beveled surfaces of the two pieces without any tongue or notch. (First example in Fig 1.) Crown grafting is about the same, differing only in having a simple notch in each piece so that they will fit perfectly. The latter is rarely practiced except upon small stocks standing in the ground, and then worked near the upper rootlet or fiber.

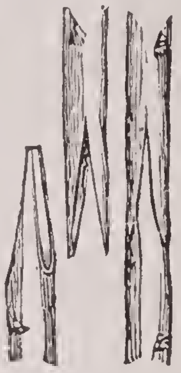


Fig. 2.—*Saddle Grafting.*

Saddle Grafting is one in which the stock is cut into the form of a smooth wedge, and made to fit in a corresponding deep notch cut into the lower end of the cion. This method is practiced more with the cherry, peach, plum, apricot, etc.

Side Grafting is that in which a notch or slit about one inch long is cut in the side of the stock, paring the outer portion, then splitting the graft and paring both the inner and outer portion, so that when inserted there will be a union of the bark and wood. The stock should not be headed in until the graft shows signs of union, and then the pruning back should be gradual.

Cleft Grafting is an old mode now seldom practiced. It consists in sawing the stock or limb off square, then splitting it down with grafting knife or chisel, cutting the lower end of the cion in the form of a wedge, and inserting it so that one side at least will be in association with the alburnum, or inner bark. The withdrawing of the chisel or knife holds the graft firm. Fig. 3.

All grafts should be firmly tied up in an envelope of cotton or other kind of cloth dipped in grafting wax, which consists of four parts of rosin and three each of bees-wax and lard, melted together. This is generally preferred, although there are of course many compositions made for the purpose. Fig. 1, last example.

Single-Bud Grafting consists in removing a portion of the wood, bark and all, from the stock, and fitting into its place a bud with a piece of wood and bark attached.

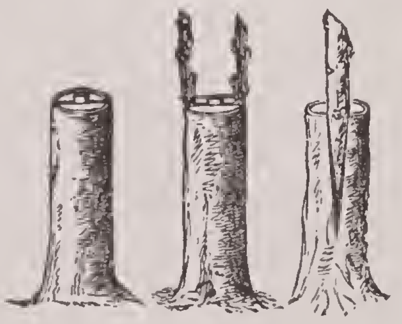


Fig. 3.—*Cleft Grafting.*

Crown Grafting is that which is generally practiced in top-grafting, which is the insertion in the margin of a stub, sawn off for the purpose, several cions. In this case, instead of splitting the stock, the grafting stiletto is carefully passed one or two inches down between the bark and wood, loosening it and slightly cracking it open, when the graft, which is cut only on one side as a tapering half-round wedge, of any desired length and with or without a shoulder, is firmly set in. Two, three or four such grafts may be set in a large limb, their number hastening the covering of the stump of the limb, and when this is effected they can be cut away.

Grafting by approach, or inarching, is grafting the cion of a tree growing near, without cutting it off from the parent tree until the new growth is established. This mode is chiefly followed with fruit plants in greenhouses, as camellias, oranges, etc., which, being put in boxes or pots, can be readily adjusted for the process. A stay bar is often of advantage, to hold the trees steady until the process is finished. The cut surfaces in this work should of course be made exactly to match.

The Cions. Procure the grafts or cions in the latter part of February, or during the first part of March. The best cions are taken from the ends of the limbs,—last year's growth. These should be cut from one to two inches below the starting of last year's growth. When they are used the small end is to be discarded. Three buds are sufficient to have on a graft. Ordinarily one twig will make but one or at the most two good grafts. The last year's growth are preferable to the suckers, or "water-sprouts," as they come into bearing sooner—but the latter will grow the thriftiest as a general rule. Grafts taken below these will come into bearing sooner than those of a year's age, but are usually of objectionable shape, and make a low, scraggly top.

The cions of different kinds of fruit should each be placed in different bundles and firmly bound with a strong cord, to which should be attached a tag or label of pine, about two inches in length, and from three-fourths to one inch in width, on which should be plainly written with a lead pencil the name of the kind of fruit it represents. The best way to preserve the cions until they are required for use is a question of no small importance. The method we prefer is to pack the bundles in saw-dust thoroughly wetted, laying thick layers of it around and between the bundles in a water-tight box. The box should be kept in a cool place, or may be buried near the surface of the ground. Freezing does not injure them, provided no artificial heat is used to extract the frost. They will do well if buried near the surface of the ground. When the weather is sufficiently warm the process of grafting may commence.

Where one has young trees raised from the seeds, the better way is to dig them up in the fall, after they have attained the size of three-eighths to half an inch in diameter; cut off the tops to within three to five inches of the root, and place them in moist soil in a cellar, filling up the spaces with the soil to within an inch of the top. Leisure hours can be employed in grafting them. In trees of this size, this is done by cutting the root just below the place which, before it was removed from the place where it grew, was at the surface of the ground, with a sharp knife, making a slant of three-fourths to one and one-fourth inches in length. Select a graft having three buds as near the same size as the stock as possible, and cut the lower end in a slant that will be in a perfect fit to the stock. Place these together, being sure that the space between the bark and the wood (the avenue for the flow of the sap) fits perfectly on one side at least. Tonguing is useless. If the graft and the stock are the same size and the barks fit on both sides, it is better, as the growth of the cion is liable to be greater. Having done this, wrap around it a strip of muslin on which melted grafting wax has previously been spread with a brush, replace it in moist soil and there let it remain until it can be re-set in the ground. It is better to have the orchard ground ready prepared, and set them where they are to remain, at a distance of thirty feet apart, as removing them again from the nursery, where they may have been placed to attain a large size, retards their growth.

Trees may be grafted in the limb after they have grown to a large size, provided they are sound and healthy. Limbs from half an inch to two inches in diameter may be grafted. This is usually done by what is called "cleft grafting."

Where the stub is more than half an inch in diameter, two grafts should be inserted in each. This makes the pressure on the inserted part of the graft more even, and gives two chances instead of only one to have a living graft. If both scions grow one should be subsequently sawn off close to the stub, for if both are allowed to grow they will form a crotch that may in future be as detrimental as it would be unsightly.

There is another method of limb grafting which may be employed, when the season is far advanced, and the bark "slips" or fails to split at the cleft in the wood, so as to render cleft-grafting difficult and often impracticable. It is to prepare the stock as in cleft grafting, then slit the bark, and if the stub be over an inch in diameter on both sides, downward for the space of an inch or more. Raise the corners of the bark slightly with the point of a knife blade; then at the slit insert a wedge made of iron or hard, seasoned wood, and loosen the edges of the bark. This being done, cover the top of the stub and the slits with wax.

These methods of grafting may be practiced on apple, pear, plum, and some other fruit trees, but for peach trees budding is preferred, which must be done later in the season, usually in the months of August and September.

Grafting Wax. This is variously made. It usually consists of rosin, tallow and beeswax. Sometimes they are mixed in equal parts; but this mixture is hardly adhesive enough; more rosin increases its tenacity. A cheap and useful compound, but sometimes found rather inconveniently adhesive to the hands, is made of four parts of rosin, two of tallow, and one of beeswax A coat of the wax, about one-twentieth of an inch thick, spread over muslin, calico, or tough and flexible paper, makes an excellent plaster for out-door grafting; or, if spread half as thick on paper, is well adapted to root grafting. In either case the strips should be narrow, that they may be easily wrapped around the graft till it is well covered, when the rest may be torn off. In making the plasters it is essential that the ingredients of the wax should be thoroughly stirred together before it is spread. A paper, soft, thin and tough, is used for wrapping. For out-door grafting in cool weather, a furnace of charcoal is sometimes necessary to soften the wax; but all out-door grafting should be done when the temperature is sufficiently mild to keep the wax soft enough to work.

Grain. This term includes all those kinds of grass which bear a straw, and which are cultivated on account of their seeds for the production of meal or flour. The word corn, or its equivalent in other languages, is frequently applied exclusively to that kind of grain which constitutes the chief nourishment of the country. Thus, in a great part of Germany, it is rye; in France, it is wheat; in the Low Countries, spelt, and in North America, maize. That the different kinds of grain grow wild in some countries is well known, as, for example, barley and oats in Germany; but they have not the perfection of the cultivated grains. These all seem to be natives of warmer climates in Asia, Africa, South America, and to be annual plants, becoming hybernating only from cultivation, since a summer does not suffice, in northern climates, for their development. In common with most grasses, they form their stalks or stems upon the lower joints of the root. Their fascicular roots spread themselves out chiefly upon the surface of the ground, which they almost cover with their thick web, while a smaller part penetrates deeper, when they find looseness of soil and nourishment to attract them. All kinds of grain contain nutritious particles of a similar character, although they vary, both in their quantity and their mixture, in various grains. These elements are: 1. Gluten, which affords the strongest nourishment for the animal body. 2. Fecula, or starch, which is very nutritious, although not so much as gluten, which, however, it seems to render more digestible. 3. A sweet mucilage, which is more nutritious than starch, but is small in quantity, and renders the grain liable to the vinous and acetous fermentations. 4. The hulls, which consist of a fibrous matter, and contain a digestible aromatic substance. 5. Moisture, which is predominant even in the dryest grain, and increases the weight of the mass, although it lessens the specific gravity; it affords no nourishment, hastens the decomposition of all kinds of grain, if they are not kept very dry, and serves, after planting, to stimulate the first motions of the germ.

Grain Growing. The result of long continued experience proves unmistakably that where the farming is good, on well drained and deeply cultivated soil, thin sowing, no matter what kind of grain, is far more profitable than thick. It is wrong to go on sowing the same quantity of seed our forefathers did when broadcasting, without taking into account the altered circumstances, such as the drill, drainage, and higher farming, and then complain because we do not have larger crops. The higher you farm the less seed is required. We lay down no particular rule, but recommend each farmer to satisfy his mind by comparative trials which quantity of seed is most profitable to him under his peculiar circumstances of soil, climate, and style of farming. It is generally known that ergot in rye, and it is to be found in no other grain, when brought into the human organism operates as a narcotic poison. The farmer ought to remove the infected plants growing in the neighborhood of his rye field.

It requires an experienced eye to discover smut in wheat, for the infested ears are not distinguished in their outer appearance from the healthy ones. The diseased grains, however, when rubbed between the fingers, burst out at the slightest pressure, and we see that, instead of the white meal, they are filled up with a dark smutty mass, which is distinguished by a nauseous smell resembling herring brine. A solution of blue vitrol, which is not hurtful to the seeds, is sure to kill the dangerous spores and at the same time is a cheap preventive.

Rust and brands infest and destroy the stem as well as the leaves. In examining your corn-fields in the beginning of summer, you will most likely find a number of plants covered all over with bright, rusty spots and lines. Mildew in grain is the mycelium of a parasitic fungus, which, sometimes very thin and cobweb-like, sometimes in a thick, felty layer, disturbs the development of the infected plant, particularly by obstructing the stomata, and by drawing its nourishment from out of the infected organs by means of little wart-like processes, through which the mycelium is attached to the plant on which it feeds. It is often found in abundance covering the leaves of the several cereals. Dark, heavy loam, if the climate is agreeable, is better adapted to the production of grain than any other. See articles on Corn, Wheat, Rye, etc.

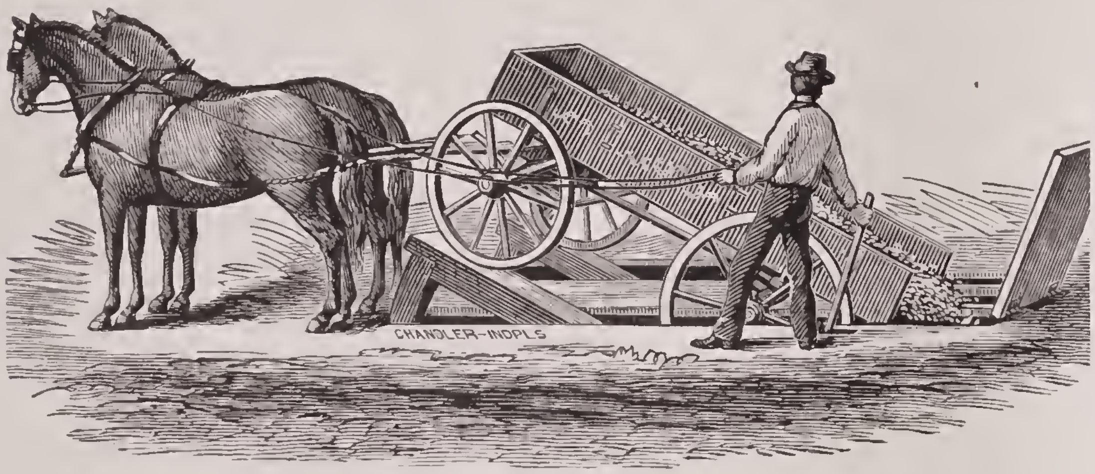


FIG. 1—*Grain Dumper*

Granary, an apartment, a division of a building, an entire building, or a very extensive store, for containing and preserving grain.

Every granary, whatever its capacity, ought to be dry, well-ventilated, inaccessible to vermin, and conveniently situated for both receiving and surrendering its contents; it ought to have appliances for regulating ventilation according to the condition of the grain and the state of the weather; it ought to afford scope for the special treatment of any grain which may happen to be attacked by disease; it ought to be so situated and constructed as to be free from injurious temperature, and from any access of foul air or damp vapor; and if it be more than a mere room or recess, for keeping a small stock of grain for a single month or two in sacks, it ought to be divided into sections by means of either fixed or movable partitions, in order that, without waste of space, different kinds of grain and different parcels of the same kind may be effectually kept separate.

A room finished off in the barn, or over the wagon shed, though often made to answer the purpose, is not a satisfactory substitute for a building devoted to this special purpose. The granary may be a very simple structure, but it should be an independent building. The size and the detail of construction will vary greatly with the requirements of different farms, but there are a few general principles which should be universally regarded. The building should be set upon stone posts, or a smooth brick wall, which should rise at least three feet above the level of the ground. This is one of the most effectual methods for keeping rats away from the grain. If walls are used, spaces should be left to allow a circulation of air under the building. Two sides of the granary should be covered with slats 2½ or 3 inches wide, and placed ½ an inch apart. The other sides should be boarded perfectly tight. The eaves should project considerably and the roof be kept constantly in repair. The floor should be made of planks closely fitted and smoothly laid. There should be at least two windows to admit light, and a ventilator should also be provided. Against the sides covered with slats, bins for holding ears of corn may be built. These should not be more than three feet wide, but in height may extend nearly to the roof. Against the sides covered with boards bins for wheat, oats and shelled corn may be constructed. These should be perfectly tight, with well-fitting covers, and provided with locks and keys. Bins for this purpose should not be more than three or four feet wide and four feet high. They should be divided off by partitions into several compartments, each holding from 10 to 40 bushels of grain, and should be marked on the inside to show the number of bushels they contain, as illustrated by Fig. 2, page 48.

GRAIN DUMPER. A modern and most convenient method of unloading grain from the wagon is illus-

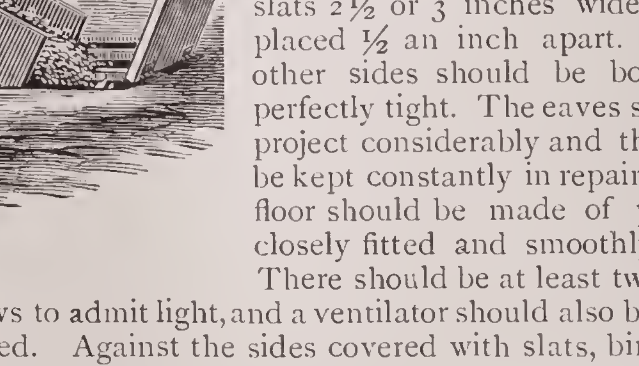


FIG. 2.—*Grain Measurer.*

trated by Fig. 1, on the preceding page. Especially is this a valuable contrivance for mills and grain elevators. It enables men to unload rapidly, thus avoiding delays and waste of time. It is made by the Nordyke & Marmon Company, of Indianapolis, Ind.

Grain Measurer. Figs. 2 and 3 are illustrations of substantial and perfectly working grain measurers, manufactured by Nichols, Shepard & Co., Battle Creek, Mich.

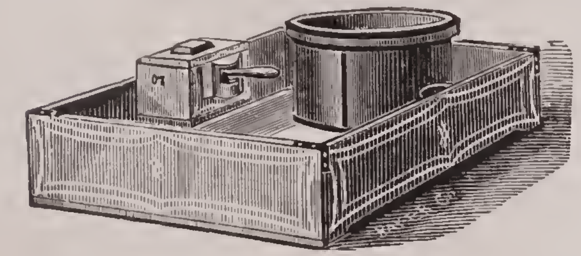


Fig. 3.—*Grain Register.*

Grange, a farm; generally a farm with a house, at a distance from neighbors; an organization of farmers for mutual instruction and self-protection.

Granite Ware, sheet-iron cooking utensils which have a clouded, bluish enamel inside and out, and are more free from poisonous matter than porcelain. No boiling of articles of food should be done now-a-days in uncoated iron vessels. Care is requisite, however, to guard against burning anything in enameled ware.

Granivorous Animals, animals which wholly or mostly feed on grain or other seeds.

Granulation, the act of forming into grains, as powder, sugar and honey. In the healing of wounds or sores, suppurative granulation is the growth of grain-like protuberances of healthy tissue, serving to fill the cavity and unite the sides. Sometimes these grow too fast; then they are unhealthy, being soft and growing beyond the edges of the wound. To prevent this, sprinkle a little powdered blue-stone or a little sulphate of zinc, and the wound will soon heal level with the surrounding surface. "Granulated sugar" is merely a selling brand of a variety of sugar. Honey at ordinary temperatures will in the course of a few weeks or months whiten and granulate, when it is said to be "candied."

Grape. The grape is honored by greater antiquity, perhaps, than any other fruit, not only as an article of diet, but also as a source of a beverage, which is more popular than that made from the other fruits. The modern "grape cure" is, perhaps, nothing but a revival of what was very universally practiced in ancient times. In most acute attacks of fevers, if the patient eats nothing but the juice and pulp of the best grapes, he will recover far more readily than by the employment of any other "victuals and drink." But this is not the place to repeat all the praises of this fruit, which has been so celebrated in prose and song. We proceed at once to the practical item of

Propagation. The most usual method is by cuttings like those of currants and gooseberries. The cions should be long enough to contain three buds and an inch or two more at each end. These are planted in the ground with one bud below for making roots, and two above for the vine. While but one vine should be allowed to grow, the two buds are taken so that in case one of them is destroyed by accident, there is another to grow. Another method of propagation is "layering," the process of which is described under that head. After one season's growth of these young plants, either in the fall or in the spring, they are to be transplanted to the vineyard, which should be a warm, sunny hillside, not steep, better if it be sandy, gravelly or shaly, and of the quality of good corn ground.

The best locality is the southwestern brow of a hill, as the temperature there is warmer and more even, and late frosts in May or June will not be followed so soon by a hot sun, which injures the vines. The drier the soil the sweeter the fruit. Some say that the grape does better where the winters are mild and the summers cool; this is probably true for hot countries, but in the extreme Northern portion of the United States they want all the heat they can get in the summer time.

Grafting the grape-vine improves the fruit, and is best done in the winter or very early in the spring, as the plants at that time do not bleed. It is believed, however, that the bleeding does no perceptible injury, except that it prevents, in grafting, a good union of the cion with the stock. Bleeding may be prevented by working into the pores of the wound, by thumb and finger, a paste of one part of calcined oyster-shells beaten to fine powder in a mortar, and three parts of cheese. A second application is sometimes necessary. Experience varies as to whether we should graft above or below the surface, or whether ring or cleft grafting is the better. Wild vines furnish the best stocks. But it is doubted whether grafting is needed in the West.

The ground should be plowed or trenched to the depth of 18 inches or two feet, being enriched by well rotted manure and thoroughly pulverized. In the States west of Lake Michigan it is best to stake off the rows north and south, about eight feet apart, for trellises, and six for stakes, so that the vines will receive all the sunshine possible. In the States east it is perhaps best to have the rows running east and west, so that the western breeze will dry off the vines quickly after the rains, which are more frequent than in the West. Where the ground is not pulverized to the depth above mentioned, holes two feet in diameter must be dug to that depth, with a mound of loose earth in the bottom of each, on which the plants are to be set, with the roots spread out as represented on page 511. The distance of plants in the rows should be 8 to 12 feet, according to the kinds and manner of training. Prune the roots smoothly, cutting off bruised ends and the long extensions. In general, set the plants so that after the earth is pressed closely upon the roots they will be at the same depth below the level of the ground they naturally grew. In Wisconsin and Minnesota they prefer to set about four inches below the surface; mulch thoroughly, and keep moist the first year; the best mulching is fresh-mown grass not in seed, lightly covered with leached wood ashes. Allow but one cane to grow, keeping it tied to a stake, and limit its height to three or four feet; allow, also, the laterals not to extend beyond two or three buds; pinch off the buds at first starting, and the tendrils too, and not wait until you have to use the knife. The second year it will be ready for the trellis or stake, and begin to bear a little, but it should not be allowed to bear fruit this year. While some viticulturists are in favor of letting the vine grow unpruned and unchecked, bower fashion, most vineyardists train to trellises or posts, and prune the vine, cutting the branches back to within three or four inches of the main stem, and leaving two or three buds for next year's fruiting; but the next year only one of these is allowed to grow, the most vigorous or the lowest being the favored one. When stake training is contemplated, the posts should be set before the planting, that the roots may not be disturbed.

The trellis consists of three wires or courses of lath fastened to the row of posts, and horizontal training is preferable to perpendicular; also, the nearer the ground the grapes can be grown and matured the better, other things being equal. A modification of the horizontal is the "fan-shaped."

In November or early winter, prune back the arms which have borne fruit the previous season, near the base or main stem, except such varieties as the Rogers' Hybrids, Isabella, Diana and some others, which should be allowed arms of old wood, and the young canes cut back, or kept back, to short spurs of one or two buds. Cultivate between the rows with a five-tooth cultivator, and use the hoe, allowing no weeds or grass to get a foothold. All grape-vines should be protected during the winter; the Concord is the hardiest, and does fairly well without being buried during the winter, but even it will do enough better for protection to make it pay. After the wounds have had a few days to season, lay the vines down upon the ground, covering with straw, seedless hay, or cornstalks and light earth; it matters but little which is next the vines. Practice and creed vary as to the propriety of trimming off some of the leaves during the summer.

The practice of what is called the "annual renewal" system is followed and highly recommended by many vineyardists. It consists in producing new canes each year for the next season's fruit. Probably its utility is owing to circumstances. Grape culturists will vary in their practice so long as one class endeavor to raise the greatest amount cheaply, irrespective of quality, and another the best quality, regardless of cost.

Overbearing should never be allowed, as it weakens the vines and renders them subject to disease and insects.

The best manure is a compost of cow-dung, old sods or loam in equal parts, and to each wagon load two bushels of air-slacked lime, one peck of salt and one bushel of ground bone, thrown broadcast upon the ground in the spring, and plowed in. Land-plaster is good, as it absorbs moisture from the atmosphere and rains, retaining it a long time, and giving it slowly back to the soil during dry weather. Cob ashes, tobacco stems, and small dead animals are also very good; but fresh stable manure should never be applied, as it causes mildew and rot. Burying manure one year on one side of the vine and the next on the other, and so on, is often very remunerative.

GATHERING THE FRUIT. Grapes are generally gathered before they are sufficiently ripe; they do not fully ripen until a week or two after they color, and the Concord is better if it is let remain on the vine four or five weeks after it turns black. The Hartford Prolific, however, is about as good as soon as it fully colors as it will ever become.

INSECTS AND DISEASES. The insect most noxious to the grape-vine in the West is a species of louse known only by its scientific name, Phylloxera (Fig. 1), which sucks the roots, causing masses of warts and knots, ultimately killing the vine. Its work is slow and sure, and the vine being weakened by it is very often destroyed more readily by mildew, rot, etc. The Concord, Hartford and Ives' Seedling are not so much attacked by it. Remedies: Whale-oil soap in solution; flooding the land for thirty or forty days after the season's growth has subsided; sulphuric carbonate of potash sprinkled on the ground in the form of powder, to be carried down into the ground by rain.

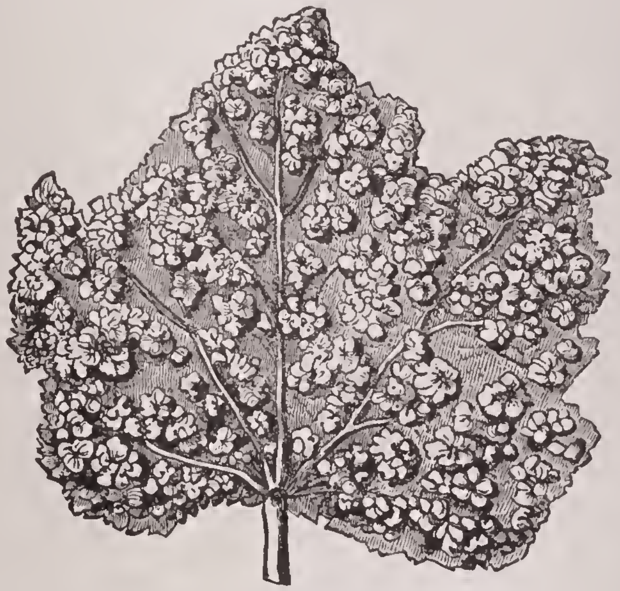
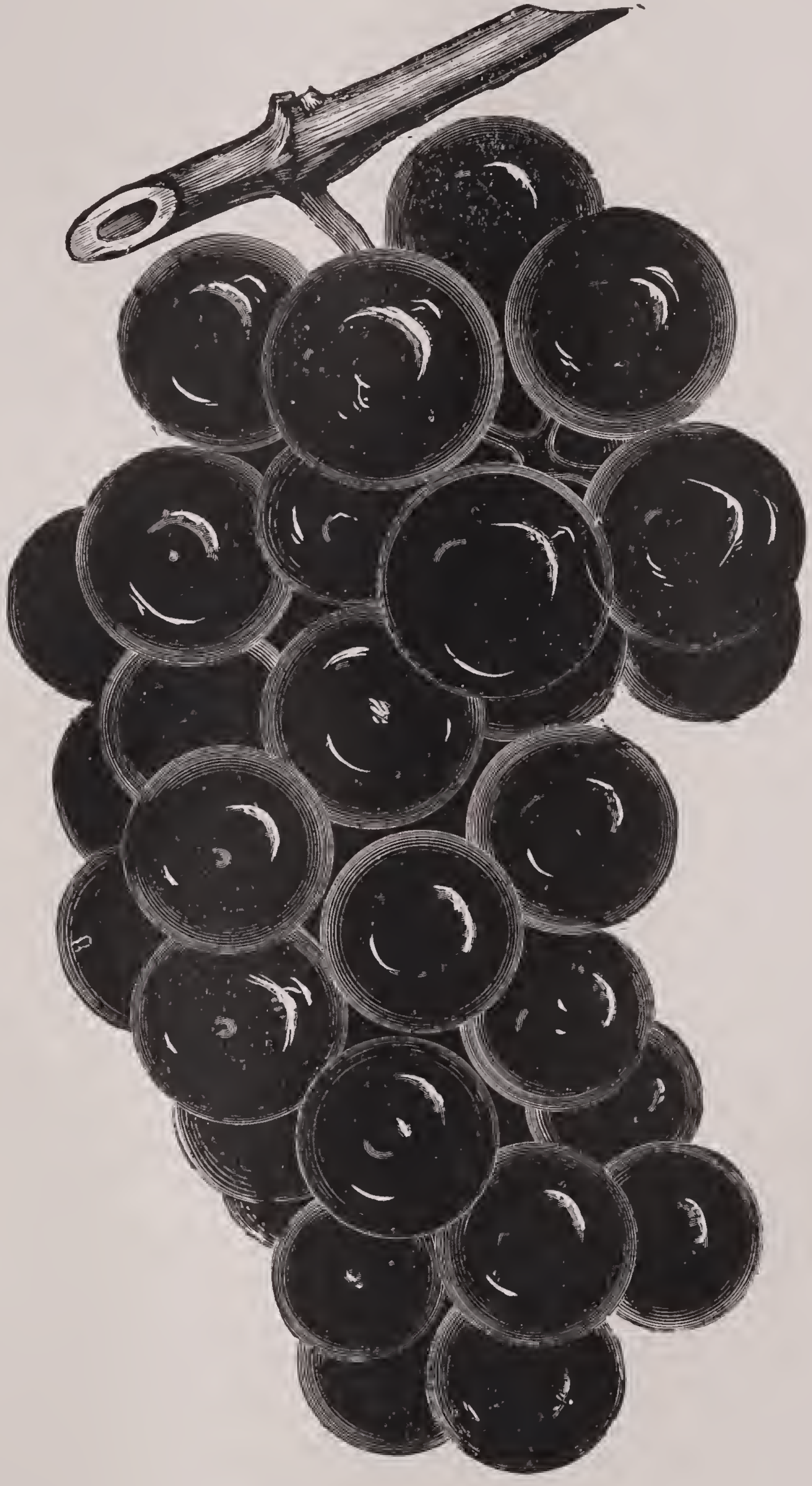


FIG. 1.—*Work of Phylloxera.*

The Thrip is a little hopping insect which infests the under side of the leaves and proves very destructive, especially upon the vines protected by high wooden fences, walls or houses. The leaves are sapped by the insect, become blanched and have a scorched appearance, die, and afterward the whole vine dies. Remedies: Night lamps and tar paper still mornings and evenings when the leaves are well grown; or, a few applications of a weak solution of carbolic acid. The Gall Louse is similar to the Thrip in its habit, and may be treated in a similar manner.



MOORE'S EARLY.

Several species of beetle infest the grape, namely, the Flea Beetle (Fig. 2), the steel-colored and the brown spotted. The flea beetle is a small, oblong, bluish or greenish insect and a very active jumper. It is the larva of the beetle that does the mischief on the vine. It is of a shiny brown color, with a row of darker spots on each segment; the head is black. The only redeeming feature about it is that it seldom appears in the same locality in great numbers during consecutive years. These beetles leave their hibernating quarters in April, and attack and destroy the young leaf-buds as soon as they appear; later they feed upon the leaves which have escaped their earlier ravages, and deposit their eggs upon them. The eggs are of an orange color, and soon hatch into a chestnut-colored larva. These larvæ also feed upon the leaves, and when they appear in great numbers sometimes strip the vines of their foliage. After a month of active life the larvæ descend to the ground and bury themselves near the surface, where they make cells of the earth and change to pupæ of a dirty yellow color. The adult beetles, issuing in the course of a few weeks, again feed upon the leaves during the autumn, doing, however, but little damage, and later seek their winter quarters beneath the bark and splinters on the vines and the stakes which support them, as well as under any rubbish that may be in the vineyard. Remedy: Take two pieces of common cotton sheeting, each being two yards long and half as wide; fasten sticks across the ends of each piece to keep the cloth open and then drench with kerosene. Give the sheets thus prepared to two persons, each having hold of the rods at opposite ends of the sheets. Then let the persons pass one sheet on either side of the vine, being careful to unite the cloth around the base of the vine; then let a third person give the stake to which the vine is attached a sharp blow with a heavy stick. Such a blow will in nearly every case jar the beetles into the sheets, where the kerosene kills them almost instantly.

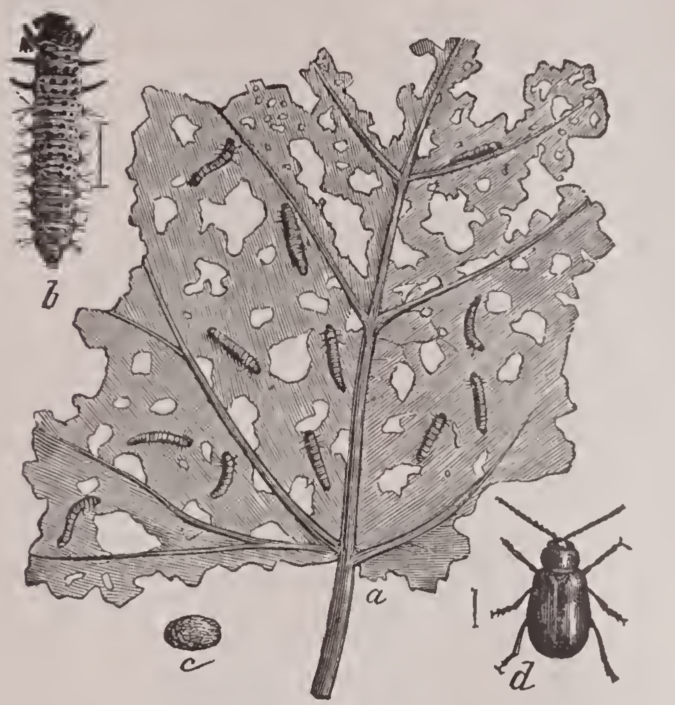


FIG. 2.—*Grape-vine Flea Beetle.* (Haltica chalybea.)
a, leaf infested; *b*, magnified view of larva; *c*, cocoon; *d*, beetle.

KEEPING THE FRUIT. Many varieties of the grape can be kept far into the winter, some even until spring; and as the earliest usually ripen in August or the first of September, with a well selected assortment of varieties we may have it in season nearly or quite as long as the apple. For keeping they should be gathered when the vines and fruit are dry (the middle of a bright day is the best), spread a few days for the evaporation of any chance moisture and the drying of the ends of the stems. All unripe, decayed and imperfect berries should be removed. Then pack in shallow boxes two or three layers deep, with or without a thickness of paper between the layers, cover the boxes and keep dry and cool as possible above the freezing point. Perfectly clean dry oats are excellent for packing: there is not the objection to them that is found in sawdust, chaff, chopped hay or other fine and dusty materials. Rye straw is excellent. The fruit will require an occasional examination, but with a little care we may enjoy it for months.

Where the Isabella, Catawba, Ionia or Diana can be grown, there is no difficulty in keeping them till the first of the new year or later. The grapes are allowed to ripen fully; they are picked and placed in shallow trays, in which they remain in an airy room to "cure." The operation of curing consists merely in a sort of wilting, by which the skin becomes toughened and will not break when the fruit is packed. The clusters, when properly "cured," are packed in boxes, usually of three or five pounds each. The bottom of the box is opened, the larger clusters laid in carefully, and smaller bunches packed in upon them in such a manner that it will require a moderate pressure to bring the cover (or, properly, the bottom) of the box to its place, where it is nailed down. The pressure used is such that when the top of the box is opened, the grapes next to it are found to be somewhat flattened. The fruit must be pressed in such a manner that it cannot shake in travel, and this can only be done with grapes the skin of which has been toughened by being properly cured. If clusters were placed in the box as they come from the vines, and subjected to the needed pressure, the skin would crack around the stems, liberating the juice, and the whole would soon pass into decay. With the Concord and related varieties, the skin is too tender to allow of long keeping, and it does not seem to toughen in the curing process.

Another Method. Take new soap boxes and nail cleats on the ends or sides, about one inch from the top, and between these, bars at various distances, as required by the varying length of the bearing shoot-cuttings. The bars are made by nailing a small strip on top of each. As late as possible in the season cut off the bearing-shoots containing the bunches, and shorten them so they will crowd between the end of the box and the top part of the bar, resting on the bottom part. Hang the bunches in their natural posotion and lay on the cover. By this method the box can be handled, carried to the light, and each bunch be examined as the winter advances. Decaying berries or bunches can be removed, and the best be kept, without any mouldy taste, as is so common when grapes are packed solid and kept late.

This process, after little expense, can be performed almost as rapidly as the persons employed can walk from one vine to another. The expense necessary is very trifling, and boys can do the work quite as well as men. Warm, bright afternoons are the proper times for this work to be done, and it should be performed faithfully every sunny day until the vines are out of danger. This mode of combating the beetle is much more effectual than any other which has been hitherto suggested; for it can be used early in the season before the vines are seriously injured and before the insects have begun to multiply. In connection with the above, the remedies which have been recommended often should, if necessary, be used. These are as follows: First, all rubbish should be removed from the vineyard, and the stakes and trellises which support the vines be well cleaned of bark and splinters, so as to afford the beetles little chance for hibernating in the vineyard. Second, if the larvæ appear in great numbers, lime should be sifted over the vines.

There are two other species of this genus noxious to the vine, which may be similarly treated.

The larvæ of several other kinds of beetle are also injurious to the vine; as, Colaspis, a yellowish grub; Fidia, or "rose-bug," chestnut brown; drops to the ground readily and easily caught like plum curculio; another rose-bug which especially infests the Clinton grape; several species of vine-chafers, which should be destroyed by dusting or syringing as soon as possible after their first appearance. Grape curculio, which like the plum curculio drops off and can be caught and killed in the same way; Bosteichus, Fig. 3, which also is injurious to the apple, the peach and the hickory; broad-necked Prionus, a creamy white grub with a pale bluish line along the back which works in the roots of grape and fruit trees; and the tile-horn Prionus, whose mischief is done before it is discovered; no remedy except to destroy the vines.

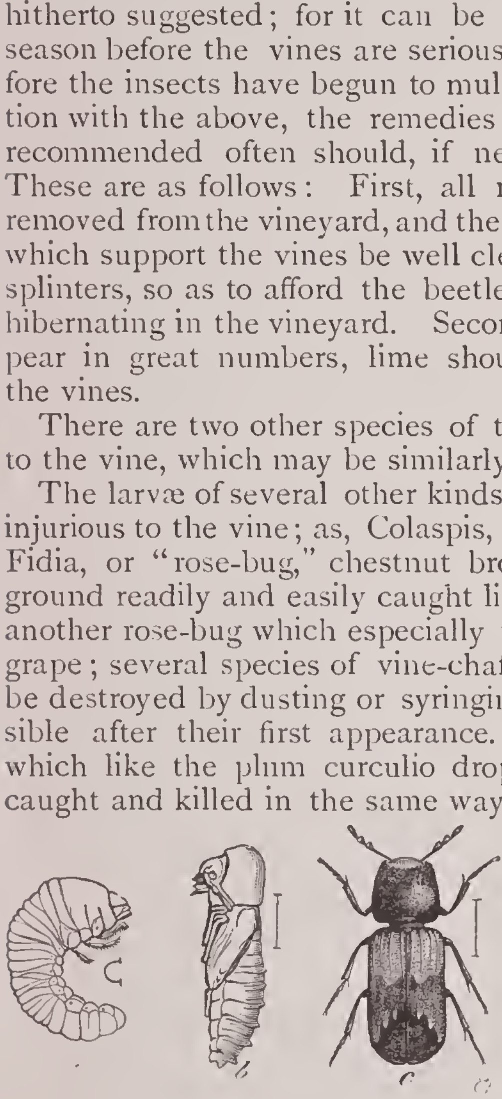


FIG. 3.— *Bosteichus basillare.*
a, larva; *b*, pupa; *c*, beetle.

The snowy tree cricket, although when young lives on plant lice and insect eggs, girdles the stems of grapes, causing them to wither and fall to the ground. Remedy: Cut off the affected twigs before hatching time and burn them.

Mildew consists of several species of fungus, and is easily detected. The best remedy known is the sprinkling of powdered sulphur and quicklime, upon the vines, which, however, is more effectual upon European varieties than upon American. The grape rot is a serious evil in the West, some varieties being far more liable to it than others. The Concord can be saved from it by a sprinkling of air-slacked lime, either common or oyster, and sulphur, in equal parts, several times during the season, when the vines are wet. It is said that it will pay to enclose each bunch of grapes in a little paper sack when danger threatens.

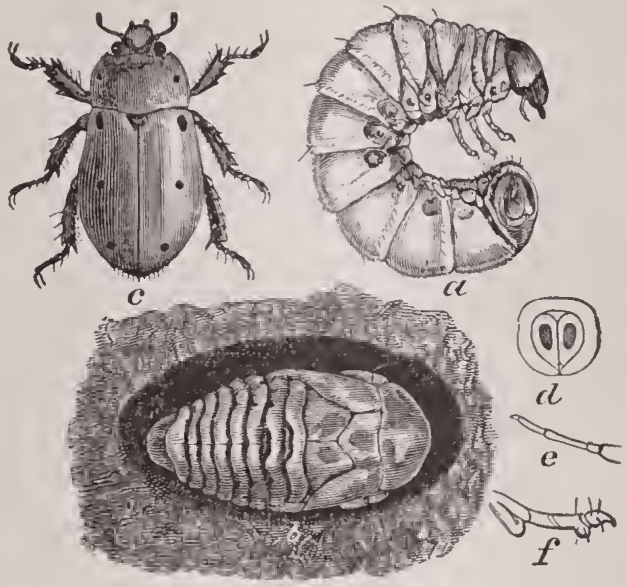


FIG. 4.—*Spotted Vine-Chafer.* (Pelidnota punctata.)
æ, larva; *b*, pupa; *c*, beetle; *d*, tip of abdomen; *e*, antenna, magnified; *f*, leg.

Some birds are troublesome to the vineyard. They can be kept off by stretching cotton twine over the vineyard, attached to laths nailed up.

The grape rot is probably due to certain states of the weather, which favor the development of Bacteria, the disease being similar to twig blight in the apple and the pear. It may be prevented by training against buildings or on high poles 12 to 20 feet high. The use of paper bags is said also to be a preventive of this, as well as of other diseases, and also a protection against birds and insects. Muslin bags are better than paper, as they are more easily tied on, and they will be good for several years' use. Paper bags, however, have the advantage of turning rain better, which is an object with some. In these bags white grapes remain of a greener color, but the other sorts color well.

VARIETIES. The most profitable varieties for wine are the Oporto and Virginia Seedling, which make a red wine; next the Martha, which makes a white wine; and, thirdly, the Delaware and Catawba,—in some places also the Herbemont. Wine from Rogers' Hybrids imitates foreign wines.

Adirondac. Bunch large, compact, shouldered; berry large, perfectly black, beginning of September, very good dessert, fair market; foliage subject to mildew.

Agawam, Rogers' No, 15. Bunch long, compact, shouldered; berry large, dark red, fair, dessert and market, middle of September; keeps well after gathering. Is a shy bearer.

Allen's Hybrid. Bunch medium, shouldered, compact; berry medium, whitish yellow, best dessert, poor market, middle of September; liable to mildew; finest of white grapes.

Alvey. Bunch medium, shouldered, berry small, black, fair dessert and market, beginning of September; has a thick, tough skin; sour, fibrous pulp and large seeds.

Autuchon, Arnold's Hybrid No. 5. Bunch long, compact, often shouldered; berries medium, greenish white, with a golden tint when fully ripe; skin thin; flesh void of pulp, sprightly and rich.

Belvidere. Hardier than the Concord, in character and quality about equal to the Perkins; ripens the beginning of September.

Brighton. Bunch medium, shouldered; berry large, strongly adhering to the stem; skin moderately thick, reddish purple; flavor rich, sprightly, vinous, moderately sweet, remarkably agreeable, not entirely free from pulp; ripens at the time of the Concord, is more vigorous and the fruit is better.

Catawba. Bunch medium, shouldered, open, red, very good dessert, fair market, October; hardy as the Concord, one to two weeks earlier, becomes foxy when too ripe; makes good wine; recovers from the attacks of the phylloxera about every third or fourth year.

Champion. Very early.

Clinton. Bunch medium, compact, shouldered; berry small, black, sour, very poor for dessert or market, October; good for red wine; very subject to insect depredations; rots badly.

Concord. Bunch long, compact, shouldered; black, very good dessert, best market, middle September; next to the best for wine; it makes a red wine; subject to rot but not to fungus; still the most profitable grape for the West. Should hang on the vine four or five weeks after coloring.

Creveling. Bunch medium, compact, shouldered; fruit black, good dessert, very poor market, middle of September; sets fruit poorly and is a thin bearer.

Croton. Bunch medium, compact, shouldered; berry small, greenish yellow, translucent, remarkably delicate and beautiful; flesh uniformly melting, sweet and of a Chasselas flavor; has but one or two seeds, which are small; hangs on the vines until late; keeps well in the winter; makes good raisins; very productive and hardy, a free grower, of firm, short-jointed wood; subject to mildew; fruit ripens the beginning of September; one of the best table grapes.

Delaware. Bunch small, compact, shouldered; berry small, light red; flesh very sweet, mild and pleasant; best dessert and market, middle of September, but is not vigorous, being of slow growth, subject to diseases and insects; does better grafted on trimmed roots and cultivated in a clay soil.

Diana. Bunch large, compact, long; berry large, light red, rather foxy, with a thick, tough skin, fair dessert and market, end of September; one of the best keepers; a thin bearer on strong soil.

Elvira. Vigorous, hardy and productive, light green fruit, but crowded and apt to rot.

Eumelan. Bunch large, compact, shouldered; berry purple black, best dessert, very poor market, middle of September; has large seeds; fruit commences coloring in August.

Eva. Like the Martha, but white and a little better in quality.

Hartford Prolific. Bunch large, compact, shouldered; berry large, black, poor dessert, good market, beginning of September, hardy and productive.

Gœthe, Rogers' No. 1. Valuable in latitude 39°; ripens late; beautiful and of fine flavor; berries very large, yellowish green, often blotched with dull red; bunch large, shouldered. Ready for use almost as soon as colored.

Herbemont. Thin skin, luscious juice; berry small, dark blue, covered with a thick, light bloom; bunch large, compact, shouldered; rather a southern grape,

Iona. Bunch large, open shouldered; fruit red, best dessert, fair market, middle of September; not vigorous, but resists diseases and insects; blossoms late.

Isabella. Bunch large, shouldered, open; berry large, oval, black, fair dessert and market, end of September; fair for wine; some seasons it fails to ripen; should be pruned to single or two-eyed spurs.

Israella. Bunch medium, compact, shouldered; berry large, oval, purple black, good dessert, poor market, middle of September; sweet, free from pulp; requires warm soil.

Ives, Ives' Seedling. Bunch medium, compact, shouldered; fruit black, good dessert, poor market, end of September; good for wine; vine vigorous, hardy and productive; does better on heavy soil; among the three best for profit in latitude 40°.

Janesville. Black, good dessert and market, beginning of September; two to three weeks earlier and hardier than the Concord; great favorite in the Northwest; second quality in flavor.

Joseph Henry. Earliest, and good as Delaware.

Lady. Bunch medium, compact, long; berry large, yellowish green, best dessert, middle of September; the best of the white grapes; foliage persistent in some sections, in other places it falls off in July and renewed in the fall and the wood seems to ripen; in the latter case the fruit withers; vine hardy as the Concord.

Lady Washington is a new and promising variety.

Lindley, Rogers' No. 9. Bunch medium size, long, compact; berry a beautiful red, fair market, dessert and wine, middle of September; hardy, vigorous and productive.

Martha. Bunch medium, open-shouldered; berry large, beautiful greenish yellow, very sweet, rather foxy, poor dessert, fair market and wine, middle of September; hardy, vigorous and productive.

Maxatawney. Bunch medium, loose generally; berry oval, greenish white with an amber tint; flesh not pulpy, very sweet and delicious, good market and wine, last of September.

Merrimac, Rogers' No. 19. Bunch large, short, broad, compact; berry large, black, good dessert and market, especially in latitude 38°; middle of September; much like the Wilder in quality; vine vigorous and prolific.

Missouri Muscadine. "Hardiest of all, and bears like a Siberian crab-apple."

Norton's Virginia. Bunch medium, shouldered, compact; berry small, dark purple, poor dessert and fair market, especially for wine, but for the latter purpose it needs water and sugar; ripens in October; needs late protection or favorable season.

Oporto. Most profitable grape in the Northwest for wine; the wine is red; bunch small, slightly shouldered; berry medium, black; flesh purple, pulpy, austere.

Perkins. Bunch medium, shouldered, compact; berry oval, light red, becoming copper-colored, covered with a light bloom; good market and wine, and in some places next to the Concord for profit; plant very hardy and productive; fruit ripens early, inclined to be foxy when over-ripe.

Prentiss. Bunch medium, skin thick, flesh good, rich, sweet flavor; one of the latest.

Salem, Rogers' No. 22. Bunch short, small, broad, compact; berry large, dark red, good dessert, market and wine; end of September; vine vigorous, productive.

Taylor's Bullitt. Bunch small, short, shouldered, compact; berry small, greenish white and amber, good toward the South, end of September; a beautiful grape.

To Kalon. Bunch large, shouldered; berry large, purple-black, very good dessert; poor market; end of September; inclined to rot.

Walter. Bunch medium, shouldered, compact; berry medium, light red, best dessert, fair market, wine and raisins; middle of September; vine does not do well in the East.

Weehawken. A fine early white grape.

Wilder, Rogers' No. 4. Bunch large, compact, shouldered, sometimes double-shouldered; berry large, black, with a slight bloom; very good dessert, market and wine; middle of September; succeeds well in the West; should be pruned to single or two-eyed spurs.

Worden. Bunch large, compact, shouldered; berry large, black, very good dessert and market; a week earlier than Concord and better in quality; valuable in the latitude of Central Illinois.

Foreign grapes are recommended strictly for cultivation under glass; and as, when thus situated, they may be considered for all practical purposes as independent of climate, and as they are, moreover, thus grown mainly if not wholly for dessert purposes, we will here copy merely the list recommended by the American Pomological Society:

Barbarossa, Prince Albert, Brigola. Black, sweet, very late; hot vinery.

Black Champion. Sweet, early; cold vinery.

Black Damascus. Sweet, late; cold vinery.

Black Frontignan. Muscat flavor, late; cold vinery.

Black Hamburg Sweet. Ripens the average time; cold vinery.

Black Prince. Sweet, ripens at the average time; cold vinery.

Black July. Sweet, early; cold vinery.

Bowood Muscat. White, Muscat flavor, ripens at the average time; hot vinery.

Buckland Sweetwater. White, sweet, ripens at the average time; cold vinery.

Calabriana Raisin. White, sweet, late; hot vinery.

Cannon-Ball Muscat. White, late; hot vinery.

Chasselas Musque, Joslin's St. Alban's. White, early; hot vinery.

Duc de Magenta. Black, sweet, early; hot vinery.

Early Silver Frontignan. White, Muscat, early; hot vinery.

Golden Hamburg, Stockwood Golden Hamburg. White, sweet, late; hot vinery.

Golden Champion. Amber, sweet, medium season; hot vinery.

Grizzly Frontignan, Red Frontignan, or Constantia. Red and yellow, Muscat, medium season; hot vinery.

Gros Colman. Purple, sweet, late; cold vinery.

Lady Down's Seedling. Black, sweet, very late; hot vinery.

Muscat of Alexandria. Black, late; hot vinery.

Muscat Hamburg. Black, average season; hot vinery.

Mrs. Prince's Black Muscat. Late; hot vinery.

Queen of Nice. White.

Red or Rose Chasselas. Red, sweet, medium season; hot vinery.

Red Lombardy. Red, sweet, medium season; hot vinery.

Rio Virgin. Royal Muscadine, white, sweet, early; cold vinery.

White Nice. White, sweet, late; hot vinery.

West's, St. Peter's. Black, sweet, very late; hot vinery.

White or Dutch Sweetwater. Sweet, early; cold vinery.

White Frontignan, or Constantia, Muscat Blanc, etc. White, Muscat, average season; hot vinery.

Wilmot's or Dutch Hamburg. Black, sweet, medium season; hot vinery.

Zinfindal. Black, sweet, average season; hot vinery.

Grass, a vast and most important natural order of plants. It comprises probably one-sixth of the whole vegetable kingdom, and contributes to the green parts of the world by far the greater part of their verdure. It includes hundreds and even thousands of species which constitute the daily food of animals, and yet it exhibits one of the simplest structures which occur among the perfect forms of vegetation, and is one of the most thoroughly natural orders known in systematic botany. It combines such amazing specific variety, with general simplicity, as to be comparatively very easy of study and arrangement. The grasses display to the economist a stupendous instance of the adaptations of plants to the uses of man and the lower animals; they afford the young botanist the best illustration of the truth and beauty of the natural orders of plants; and they demonstrate, in ten thousand other ways, by their organism, their mechanical transmutations, their connection with soil and light and air, and the mighty and multitudinous parts which they display between lifeless elements and living bodies, the providence, wisdom, and benignity of the Creator. They comprise all the plants which yield grain, most of those which constitute pasture, some of the best which yield sugar, and not a few which abound in useful secretions, grateful juices and fragrant odors. Their thousands of species are distinguished from one another, not only by obvious botanical characters, but by their nutritive values, their economical adaptations, their periods of flowering, their habits of duration, their methods and seasons of growth, and their love or dislike of particular soils and situations. Their flowers, though unheeded or thought obscure by superficial observers, are remarkable for the perfection of their parts, the elegance of their structure, and the blending of only one set of differential marks with an enormous variety of generic and specific characters; and either by the texture of their organs, the number of their stamens, or the relation of their sexes, or especially by the form, texture, appearance, number, position, and arrangement of glumes, paleæ and scales, they afford means of a far readier and surer discrimination than if they were among the most gorgeous and complicated glories of the flower garden.

The vegetable kingdom is divided into three great natural orders, called Acrogenous, Exogenous, and Endogenous, terms referring to their different modes of growing. To the last of these belong the grasses. The word Endogenous means ingrowing; that is, the increase in the growth takes place upon the interior of the stem, which is often hollow, though mostly filled with a soft, pithy substance, which becomes harder as it nears the outer surface of the stem. The peculiar formation of the leaves of endogenous plants is also striking; the veins all run parallel with each other, mostly throughout their entire length, instead of branching off and forming the beautiful and prominent network so noticeable in others. To this order also belong a variety of plants differing widely from the grasses, such as some species of of the Lilies, the Orchids, and many more, some of which will be mentioned hereafter.

The stems of most plants are much branched, but the formation of the grasses is peculiar, the stalk being mostly tubular and jointed, and quite simple, except where, in some instances, it is parted to give place to a cluster of flowers. The leaves are very long and narrow, and the flowers are variously arranged, sometimes scattered loosely upon the stem, as in the oats, sometimes in a short, compact head, suspended from the ends of long and slender branchlets, as in the Fescue grasses; and sometimes they are densely crowded at the end of the stem, in a lengthened spike, as in Wheat, Rye and Timothy. Each flower is composed of concave valves, placed one over the other; they are most conspicuous when the beautiful white, yellow, purple or scarlet anthers, which are hung gracefully upon their slender filaments, project from the lips of the corolla; the plant is then in bloom; and who does not admire a specimen of fresh-blown Foxtail or Timothy, especially when on some foggy morning the minute particles of moisture have settled upon the delicate stamens, giving them the appearance of being thickly studded with jewels?

We have said that many of these plants have jointed stems; this is observed in those whose leaves grow one above the other; each joint here answers the double purpose of giving strength to the stem and support to the leaf. But, in other varieties, the only leaves produced are what are called radical, or leaves growing from the root; with these the stems are not jointed, but receive additional strength from their being sometimes triangular or square, and mostly very fleshy and stout.

It is a remarkable provision of Nature, that those plants which appear to have been designed for food, either bear seed in great abundance, or are supplied with some separate provision for reproducing themselves; this is particularly noticeable in the grasses. Wheat, Rye, Corn, Oats, Rice, and Barley, which constitute staple articles of food, all produce their seed in great quantities; while in many species whose seed supply the wants of the birds, the roots are perennial and creeping, and are continually sending up suckers, thus increasing themselves many-fold by a distinct method.

Those seeds which require to be sown every year are reserved for the use of man, whose superior intellect teaches him the proper mode of rendering them useful; while the inferior animals depend entirely upon that provision which Nature has made for their supply.

The cereal grasses, or grain plants, are very rapid in their growth, and in a surprisingly short time send up a tall, hollow stem, divided by joints where the leaves are inserted, one at each joint, on the alternate sides of the stem; each leaf embracing the stem like a sheath.

Wheat stands at the head of the cereal grasses for its great productiveness and utility. There is no doubt of its great antiquity, grains having frequently been found enclosed with the mummies of Egypt. Some of these having been sown, have produced plants similar to those now grown in the Levant.

We do not wish, however, to discuss the cereal grains in this article, but will confine ourselves to those plants which come under the head of the term grass as used in every-day life by many people. They apply it to all those plants which are used for pastures and meadows. This is a classification, however, founded upon use alone, disregarding all the other features of the plants. A great variety of grasses and other plants are known by the same name in different sections, or one plant may have several names. Such names afford little guide as to what is meant. There is such a variance in this respect that without the Latin name is given, one cannot be sure that he is correct in his naming.

Our Western prairies are particularly excellent for the raising of the grains and hay, on account of the humus consisting so largely of the remains of the prairie grass which has for many centuries grown upon them. Were the climate always favorable, the prairies of the West would far excel all the rest of the world every year in the production of these most useful articles of food and forage. In Illinois, Wisconsin, Iowa and Missouri, forage grasses are more profitable than the small grains. Among the many kinds of grass which have been profitably cultivated for hay, we will name, in the order of their popularity, only these: Timothy, red-top, Hungarian, millet, orchard grass, the fescues and blue grass. The last mentioned, although little cultivated, constitutes our most valuable grass for forage, both in respect to its nutritive qualities and its universality of growth. The species abounding in the Northern States is supposed by some to be different from the "blue grass of Kentucky," and by others to be a variety of the same. Timothy flourishes in all soils except such as are wet, too light, dry or sandy, and is found in perfection on the rich clay loams between 40° and 44° north latitude. Orchard grass furnishes three good crops in one season. The kind of grass suited for permanent pasture depends upon the kind of soil. Indeed, it is hardly worth while to try to seed down permanently any but moist soils. For these the following kinds of grasses are best suited: Red top, 5 pounds per acre; creeping bent, five pounds, meadow spear-grass, 4 pounds; fowl meadow-grass, 4 pounds; red fescue, 5 pounds; meadow oat-grass, 4 pounds; crested dog's tail, 3 pounds; timothy, 3 pounds.

CULTIVATION OF THE GRASSES. As a general rule, grass seeds do best when sown early in the spring, in a mellow soil. If this is done while the frost is leaving the ground, no harrowing will be necessary, as the spring rains wash the seed into the porous ground and secure to it an early germination. They are also successfully sown in August or September, when the fall rains will generally give them sufficient growth to stand the winter, if the land be free from standing water. Many judicious farmers renovate their old, worn-out meadows by giving them a coating of unfermented manure and then turning the sod completely over. On the surface thus plowed, a dressing of well rotted manure or compost with ashes is spread and thoroughly harrowed in lengthwise with the furrows. The seed is then sown and slightly harrowed in, and the decomposing manure, with the stubble and roots of the old sod, give an immediate and luxuriant growth. Grain may occupy the land with the grass seed, but if the latter be sown alone and sufficiently thick, the young plants will exclude the weeds and occupy the soil as profitably as can be done with the grain. For a good coating of grass, the English method is to mix together and sow on a single acre, without any grain, a bushel or more of various seeds best adapted to the purpose. Sowing broadcast by hand, on a very calm day, is a good method, if skillfully done; otherwise one of the modern drills should be used.

Lands that should be kept in perpetual grass are such as are frequently under water, heavy, tenacious clays, and the steep hillside tracts which are liable to wash. Low bottom lands are of course the most profitable for haying, as they are kept rich by overflows. Strong clay lands can not be properly worked with the plow without great labor, unless when under-drained and well filled with manure; yet these soils are, next to the bottom lands, the most profitable for hay crops. In breaking up such land it should be well plowed, manured, harrowed and heavily seeded to grass; and if any deficiency of seed or growth is manifested they should receive an addition of seed, with a compost dressing. A Wisconsin dairyman, however, maintains that surface cultivation, without plowing, is the best. The necessities and advantages of seeding steep hillsides, subject to wash by the rains, are too apparent to need any illustration. It is well to pasture such land to sheep, as they drop most of their manure on the higher points, which is partially washed down and sustains the fertility of every part. Very stony land should not be broken up by the plow for the meadow any more than for any other purpose.

Permanent meadows and pastures should be now and then renovated, as there are not returned to them quite all the elements that are taken from them. After skimming the cream off them for a number of years, returning to them only the grosser constituents will not restore to them their original richness. Ground bones, gypsum, and in short whatever tends to develop an exuberant vegetation, must be constantly added to the ground. Ashes and salt are particularly good for pasture lands, as their office is to cause the earth to give up to the grass and other forage what plant food it contains. Lime, bone and gypsum add to the quantity of plant food in the soil. Permanent meadow lands, if constantly cropped without manures, may be exhausted with much greater rapidity than pastures, though this depreciation is much more gradual than with tillage lands. The proper time of applying fertilizers is by scattering them over the surface when the grass is just commencing a vigorous growth in the spring, or simultaneously with the first rains after mowing.

While meadows may be pastured with impunity in the fall when the ground is dry and hard, they should never be pastured in the spring.

As with all other crops, there should be rotation with grass. Instead of turning an old meadow directly into a new one, better devote the ground to other crops for a few years.

As to the time for cutting grass, much depends on the kind of grass and other circumstances. It yields more substance when cut after the seed is fully formed, say when it is between the milk and dough state; but it is preferred by stock when it has been cut in the flower, or just before. The curing of grass for hay is pretty universally understood by the farmers of the West at the present day. They know that the best curing is effected on drying but rather cloudy days, and that two days is abundantly sufficient time for curing. All rain or heavy dew is a damage, if it falls upon grass partly cured. After partially drying it is best to let it remain a few days in cocks, on the same principle, as it were, that we prepare the most palatable dishes for the table by a slow simmering toward the last in a closed vessel. Some recommend that hay should go into the barn or stack, not perfectly dry and crisp, but slightly soft and moist in its own juices, and should therefore be stacked or stowed away in the barn at precisely the right time: others say, the drier the better.

As to the varieties of machinery for haying, we refer to the article Hay. In this department of farming, machinery has a signal advantage over the old practice of hand labor. The introduction of the mower has caused our meadows to be cleared of stones, roots, etc., and to be rolled down smoothly with a roller, all of which is a decided advantage to the actual yield of the crops.

As to threshing for seed, many kinds, as orchard grass, are best treated by taking a handful at a time and switching it over a barrel top. They cannot be threshed clean or winnowed properly with a threshing-machine.

Timothy constitutes the staple hay crop throughout the Northern and Western States; it thrives on most soils, in nearly all situations, averaging two to three feet in height; its best development is on the rich clays and clay loams between 40° and 44° north latitude; its roots are perennial, it is easy of cultivation, is hardy, and averages one and a half to three tons per acre, but affords but little aftermath; both green and cured, it is relished by cattle, sheep and horses; its nutritive power is computed at half its weight, dry; stands pasturage well throughout the season. It is also a valuable crop for seed, an acre yielding 15 to 25 bushels of clean seed, worth in the market $2 to $4 a bushel. The seed, at the rate of 6 to 12 quarts to the acre, may be sown either in the fall or spring, a fine tilth requiring the least and a stiff clay the most. It is well to sow it on wheat or rye in August or September. When sown alone or with other grasses early in the season on a rich soil, it will produce a good crop the same year. It is often sown with red clover on the plan that it should be cut when in bloom. Its seed ripens after that of clover. In New England and New York this is known as Herd's grass, and in some sections it is called "cat's-tail," the most appropriate name of all. Its only scientific name is Phleum pratense.

Red-Top is considered next in value to timothy for hay, being hardy, luxuriant, preferring a wet or marshy ground, if a little sandy the better, averaging one and one-half to two feet in height, with a yield of 875 pounds of nutrient material to the ton. Its roots are perennial, it flowers late, makes good pasture, fair hay, yielding two to four tons to the acre; flourishes throughout the United States. Of the seed, sow 15 to 30 quarts to the acre, with wheat, in September. Should be cut when in bloom and then may be pastured. Relished by cattle. Known as Herd's grass in Pennsylvania, Burdin's grass in Rhode Island, Red Bent in some places, Summer Dew in others, Fowl Meadow, Fine Bent, etc., etc., but to scientists only as Agrostis vulgaris. Another species of this (A. stricta) is known by some of the above names.

Blue Grass far excels all others for pasturage, but is of little value as hay. It is the most common grass known. That which abounds in the North has been supposed by some persons to be of a different species or variety from that of Kentucky, but probably without sufficient foundation. It reaches its highest perfection in strong limestone soils, particularly in the rich uplands west of the Alleghany mountains. It might be considered an evergreen grass, as it retains its greenness, as well as its virtues, through the winter, except when there is much freezing with no snow on the ground. From it the people of the Ohio river valley, the upper Mississippi valley and the Lake region obtain most of their milk, butter and cheese. It is the most forward grass in the spring, and ripens its seed in June; whence one of its local names, "June grass." The seed immediately germinates under the refreshing showers of that season, and the young grass sends out its long, slender leaves one to three feet. One acre of good blue grass is considered equal in value to an acre of corn, and it costs much less. One acre will keep a cow. The yield, per acre, is estimated at three to five tons, dry. Nutritive matter, 1,317 pounds per ton. It is also the best lawn grass. In sowing, supply 10 to 15 pounds of the seed to the acre. It is not well adapted to alternate husbandry, as it requires more than one summer to get well established; but it is persistent, and is often regarded as a troublesome weed. Known also as Green grass, Meadow grass, Spear grass, Kentucky Blue grass, Smooth-stalked grass, etc., but to the scientific world simply as Poa pratensis.

Another species, Poa compressa, has flat stalks, which are dark green, hard, shrinking the least of all grasses in drying, rich in nutriment, dwarfish in habit, abounding in the Northern States, tenacious of its foot-hold, forming a good covering to the ground, and known also as Blue grass, Wire grass and Flat-stalked Meadow grass. Poa trivialis, or Roughish Meadow grass, has the appearance of the "great queen of grasses," is somewhat valuable for both hay and pasture, affects low, wet ground, grows about 20 inches high, and is best cut when in seed, about July 10; but it is more highly esteemed in England and Scotland than in this country.

False Red-Top (Poa serotina) takes the place of blue grass in Wisconsin and Minnesota. Called also Swamp Wire grass. Was formerly called Fowl Meadow grass. The stem is evergreen, tall, thriving on low, wet land, is good for pasture, and in the region named, also for hay, as such being soft and nutritious.

Dwarf or *Early Meadow* grass (Poa annua) is found everywhere in old pastures and about dwellings, making much trouble by constantly springing up in paths and drives. It is pale green, sweet, short and early, fit for pasture only.

Millet (Setaria Italica), or *Bengal Grass*. This runs wild in this country, where it is sown, but as a forage plant it is said to be not equal to oats. It requires a dry, rich, well pulverized soil. Sow broadcast or in drills, from May to July. It ripens in 60 to 75 days. If sown broadcast for hay, 40 quarts of seed to the acre will be required; if in drills, for the grain, eight quarts will be sufficient. It may be cured like hay, yielding from two to four tons to the acre; or it may be used profitably as green fodder. All cattle relish it, and fowls are fond of the grain. For green fodder it should be cut before the first seeds begin to ripen; and for grain, just before they begin to fall. It grows two to four feet high, and yields 25 to 100 bushels of seed per acre. It stands drouth well, and is particularly adapted to dairy farms. In the Western States, however, the above has mainly given place to the next mentioned.

Hungarian Grass, or *German Millet*. This is liked by all farm stock, but the seeds, if allowed to get ripe, are supposed to bring on disorders of the kidneys, especially in horses. For this reason it should be fed rather sparingly to horses unless it has been cut when in bloom. Two feeds of Hungarian per day, with one of straw, to cattle, will carry them nicely through the winter. It is an annual, enduring drouth remarkably well, has many leaves, which are juicy and make an abundance of nice fodder. It attains its greatest luxuriance on soils of medium consistency and richness but does very well on light and dry plains.

Egyptian, *East Indian*, or *Pearl Millet* (Pencillaria spicata). This new millet is quite distinct from all other species, and is without doubt destined to take a place in the front rank of valuable forage plants. Sown in light, sandy soil, the plants at first appear feeble, resembling broom-corn; but when a few inches above ground they begin to tiller, and new shoots appear very rapidly from the original root, until they number a half dozen to a dozen or more. The stems at first are nearly prostrate, but when about two feet long they begin to assume an upright position, reaching a height of eight to ten feet, not differing in color or substance from common Indian corn. In fact, it is one of the most "leafy" plants in the great family to which it belongs. When the stems have reached nearly their full height, the seed or flower spikes appear near their summit. As soon as the first or principal flower spike appears, the stems throw out lateral branches from every joint, these in turn producing leaves and flower spikes. When cultivated for fodder, the seed should be dropped in drills, and given plenty of room on account of the peculiar habit of tillering. The fodder is in the best condition for cutting and curing when the stalks are five or six feet high; but if used for soiling, it might be cut earlier or later, at the convenience of the cultivator; the stumps sprouting and throwing up a new growth, continue to grow until killed by frosts. Cows, horses, and other farm stock are exceedingly fond of this kind of millet, eating it with as much avidity and apparent relish as they do the green leaves of corn. Ninety-five tons of green fodder have been grown from one acre. West of the Missouri river it may be sowed on upland, in drills two and one-half feet apart, two quarts per acre; hoe twice before it is a foot high; after that no weeds will get a foothold, so rapid and luxuriant is its growth, seeds stooling 10 to 25 stalks. Is not easy to be blown down by the wind, and stands drouth wonderfully well. Probably of greater value to young stock as a fodder plant than corn. All kinds of stock are over-fond of it. May be cut four times. Land good for corn is all it wants. The seed will not mature in the Northern States.

Orchard Grass is the best grass we grow in the shade. It will grow three to five feet high, yield three to five tons to the acre, is at home in the Northern States, and requires a porous, deep and fertile soil; sow the seed in March at the rate of 20 to 30 pounds to the acre, and it will take possession of the soil as a perennial; may be mowed from June to September; but it is best to cut the first crop just before the seed ripens, and pasture it the rest of the season. To secure a tender, succulent herbage, it should be fed closely. The seed is remarkably light, weighing only 12 to 15 pounds per bushel. Its tendency to grow in stools or tussocks is an objection to it as a meadow grass.

American or *Swamp Cock's-foot* is another species of the foregoing, yielding a large amount of grass or hay, but of inferior quality.

The *Fescues*. The *Tall* seems to be more nutritive than any other grass. It grows three feet high, does best in a black, rich loam, flowers the first week in July, ripens its seeds the last week, but is best cut when in flower. The *Meadow* species likes a boggy soil, bears well, and produces an early grass, much relished by cattle, either green or cured as hay. It is an excellent pasture grass, forming a considerable portion of the turf of old pastures and fields. Ripening its seeds early, they sow themselves, germinate and take possession of the ground after other crops are cut. The leaves are long and tender. It is not sown much in this country, and when it is sown at all it should be mixed with other grasses, as orchard, rye, or June. *Spiked* fescue is adapted to a rich loam, and produces the best of hay and pasture. *Purple*, *Sheep's*, *Hard* and *Floating* fescues are all natives of this country and good pasture grasses. Sheep's fescue is plentiful in mountainous regions and adjacent plains. It is deemed a nutritious grass, notwithstanding its hard, wiry appearance. It assumes various forms, according to conditions of location; grows about two feet high, chiefly in bunches or stools, with erect, straight, stiff culms and long narrow leaves of pale green color.

Sweet-Scented Vernal Grass. This is one of the earliest in spring and latest in autum, luxuriating in a dry, sandy loam, and affording two to three crops a season. Its chief value lies in its energy in taking possession of old, worn-out fields; and it is this species of grass that gives that delightful perfume to new-mown hay in the East.

The *Tall Oat Grass* is early, luxuriant, grows about five feet high, makes fair hay but better pasture, and flourishes in a loam or clay soil. Good for soiling and for rowen. It is often found on the borders of fields, hedges, woods and pastures. Has been considerably cultivated.

Meadow Foxtail is also an excellent pasture grass, resembling timothy in appearance, but earlier, and has a softer seed-top. It thrives on all soils but the driest. It is relished by stock of all kinds, and gives an abundant aftermath. In all lands, therefore, designed for pasture, it should form a considerable portion of the mixture. It will endure almost any degree of forcing, by liquid manures or irrigation. To gain a firm footing in the soil, it requires three or four years. The seed is covered with soft, wooly husks and is consequently light, weighing but five pounds to the bushel and containing 76,000 seeds to the ounce.

The original prairie grasses are still abundant west of Missouri and the Missouri river, but they will all eventually give way to cultivated crops.

Many other species of grass are of some value and are sometimes sown with standard kinds; as, White Bent, Fiorin, Brome, Chess, Perennial Rye, Ribbon, Bermuda, Barnyard, Crab, Tussock, Buffalo, Mesquit, Arundo, Gama, Grama, Hair, Thin, Blue-joint, etc., etc., but they deserve no particular notice.

Grass Lands, lands producing herbage for the feeding of farm stock.

Grass, To Crystallize. Take 1 pound of alum, pulverize and dissolve in 1 quart of water, but do not let it boil; pour the solution into a deep earthen jar, and let it stand until about blood-warm. Fasten your grasses with strings to a stick laid across the top of the jar; set away in a cool place where they will not be disturbed for 12 hours, then take them out and let them drain. For blue crystals use indigo or washing-blue; for yellow, boil a few saffron leaves in a little water and mix it with the alum water; for pink or red, use Prussian red, the more you use the brighter the color. The solution may be heated over and used until the alum is gone. Be sure and have your grasses perfectly dry before putting them into the water. Press some green and autumn leaves to put in your bouquets. Some bitter-sweet berries (if you can get them) will be quite an addition.

Grasshoppers. At the present day this term is limited by exact writers to those green insects which are akin to and include the Katydid, while all the grayish insects ordinarily called "grasshoppers" are truly locusts. See Insects.

Gravel, the formation of stone or calculous substances in some of the urinary organs. These agents are originally contained in the food and drinks taken. When the functions are in a healthy condition these substances are carried off in the regular secretions, but when, owing to debility of some of the organs, generally the kidneys, there is an excess of ureic acid in the system, which, uniting with the calculous particles, form larger masses or stones, these are sometimes so large that they will not easily pass off through the urinary ducts. This stone may lodge in the kidneys or in the ureters, or it may pass into the bladder, and if not neutralized or removed will cause inflammation in the parts.

If the stone is lodged in the kidneys, a severe and steady pain is experienced in the small of the back. The most intense pain, however, is felt when the substance is passing through the ureters from the kidneys to the bladder. This pain is so severe sometimes as to cause fainting and convulsions. When the stone is lodged in the bladder, very distressing pains will be felt in that organ, accompanied with more or less inflammation and an itching along the urethra.

In treating this distressing disease, should the pain be severe, which is generally the case, give first an opiate,—from 40 to 60 drops of laudanum, or ½ grain of morphine, and repeat in a short time. Then administer suitable diuretics, warm fomentations, etc. When the urgent symptoms have been relieved, give a hydragogue cathartic, as podophyllin and cream of tartar. Remedies should then be administered to dissolve the stone and counteract the tendency in the system to its formation. The juice of red onions is claimed to be a solvent of the stone. A gill is to be drunk morning and evening, for three days. An herb known as gravel-root, common in some sections of the West, is said to be a specific in this disease. It should be freely used in the form of a decoction.

Gravy. A Cheap Brown Gravy. Take 1 pound of gravy beef and a sheep's melt; cut it into slices, dredge them with flour, and fry them lightly in butter; then pour in not quite 1 pint of water. Add a seasoning of pepper and salt, a small onion, and a piece of celery cut into slices. Set the stew-pan over the fire, and let it stew slowly for 2 hours. Skim it well; strain it; add 1 spoonful of catsup, and set it by for use.

Gravy for Hashes, etc. Break some bones, and put them into a stewpan, with any spare cuttings of meat you may have; add a little pepper, salt, and 12 allspice, ½ head of celery, and 1 bunch of sweet herbs, and simmer it for about 2 hours, with sufficient water to cover it. Cut 1 small onion into slices, fry it in a piece of butter, and boil it up with the gravy for 15 or 20 minutes. Strain it into another stewpan, with two tablespoonfuls of walnut catsup, and a piece of butter rolled in flour, boil it up, and it will be ready for your meat.

Fish Gravy. Skin, clean, cut up and soak 3 small eels; put them in a stewpan and cover them with cold water; add 2 or 3 anchovies (or a little essence of anchovy); add some sweet herbs, whole pepper and mace, lemon-peel, and a shred of horse-radish. Stew gently till the fish is drawn down, and put in, when about half done, a crust of bread toasted to a high color. Strain off, thicken with a piece of butter and flour, and it is ready for use with almost any kind of fish.

GRAVY FOR A GOOSE OR DUCK. Put 1 set of giblets and ½ pound of lean beef into a stewpan, with 3 sage leaves, 1 onion, some whole pepper, salt, and 3 pints of water, and boil it for 3 hours; then add 1 glass of port wine, with a spoonful of flour mixed smooth to thicken it, and boil again for 2 or 3 minutes.

WHITE GRAVY. This gravy is the stock of several white sauces, and is made thus: Put into a quart stewpan 3 pounds of lean veal, cut into dice, and ½ pound of lean ham, cut smaller; add a glass of cold water, and put over the fire until the "white glace," or jelly, forms on the bottom of the pan; then add 3 pints of cold water, 1 bunch of savory herbs, 1 sliced onion, and 1 blade of mace. Let it slowly come to the boil, then add a little salt, skim carefully, and simmer slowly for about 3 hours; strain, and when quite cold remove all the fat.

Grayling, an excellent fish of the salmon tribe. See page 463.

Graze, to eat grass and small herbage, as cattle graze on the meadows.

Grazier, a farmer who employs himself principally in buying, feeding and selling cattle and sheep. He differs from a stock-farmer in paying little or no attention to the breeding or rearing of stock, in having a closer connection and far more frequent interchange with the markets for stock, in devoting his chief professional skill to the speediest and most profitable fattening of the particular breeds and individuals which he judges to have the best adaptation to his pastures and to the markets. He requires a good knowledge of the many different breeds of stock, an intimate acquaintance with the peculiar adaptations or non-adaptations of each breed to such circumstances of climate and pasture as those which characterize his farm, a ready discernment of the excellencies or defects of any individual of each breed, a profound knowledge of the many principles and practices involved in the most economical treatment of grass lands and thoroughly mercantile habits in selecting the best markets, in making the seasonable purchases and sales, and in subordinating his whole professional conduct to the fluctuations and even the caprices of demand.

Grease, a local inflammation of the heels of horses, causing an unsightly condition of the parts. It is the result of suppurative inflammatory action of the skin and heels of the hind legs, usually, but sometimes of the fore ones. It is more common with coarse-bred Western horses and heavy breeds than in well or fine-bred horses.

Grease or **Fat.** TO PRESERVE GREASE. Boil all the scraps, rinds and bones in a weak lye, and the purer grease in clear water. Let the mixture cool, take off the cake of grease and strain it. It is well to do this occasionally, as you save it; for when kept for a long time, impure grease becomes offensive. You must be careful to dry off all the water before laying it away in the grease tub, if you wish it to keep sweet. The best plan to collect drippings is to put it while warm into water nearly cold. Any impurities it may contain will sink to the bottom.

To preserve soap-grease, fill a cask with good strong lye, and drop all refuse grease therein. Stir up the mixture once a week.

TO TAKE GREASE OUT OF CARPETS. As soon as it is dropped put on plenty of wheat or buckwheat flour, whiting or magnesia, to absorb the oil and keep it from spreading. If the oil is near a seam, rip it so that the oil will not spread, and put whiting on the floor under the carpet. Next day sweep up all the flour above and under the carpet with a stiff brush, and put on plenty of fresh flour. The above is in case oil is dropped. To extract simple grease spots, rub them with white flannel dipped in raw spirits of turpentine. If they show after a while rub again, on both sides. If there are grease spots on the floor remove them with potters' clay before the carpet is laid down.

TO REMOVE GREASE FROM CLOTH AND WOOLEN ARTICLES. Place a cotton or woolen cloth, or a piece of blotting paper under the article to be cleansed, then rub upon the spots some pure benzine, and the grease will disappear. Be sure to place a cloth under the garment to be operated upon, otherwise a circular stain will remain, which cannot be removed. The benzine drives the grease through the article to be cleaned, and is absorbed by the cloth placed under it. After the spot is removed, continue to rub with a dry cloth until the benzine is evaporated, thus avoiding a stain.

Another way to remove grease spots from goods and paper, especially the latter, is to grate on the spot a thick coating of French chalk; common chalk will answer, but it is not as good as the French. Cover the spot with brown paper, set on a moderately warm iron, and let it remain till cold. Care must be taken not to have the iron so hot as to scorch or change the color of the cloth. If the grease does not appear to be out, on removing the iron, grate on more chalk, heat the iron again, and put it on. Repeat the process until the grease is entirely out.

Refined benzine has become the almost universal means for removing grease spots and dirt. Directions for using it are given just above.

TO REMOVE GREASE FROM SILK. Separate the yolk of an egg from the white as perfectly as possible; stretch the fabric on a board, and, with a soft clothes-brush, dip into the yolk and rub the spot with it until the grease seems loosened. The yolk will not injure the most delicate colors, but the rubbing may if too severe. Rinse with warm rain-water, rubbing the edges with a damp cloth, and clapping the whole between dry towels. If the stain is not quite gone, repeat the process.

Another method is to rub the spots of the silk lightly and rapidly with a clean, soft cotton rag, dipped in chloroform, and the grease will immediately disappear without injuring the color of the silk. Be careful to rub the article lightly and rapidly, and finish with a clean, dry cloth. Very highly rarefied benzine, such as is prepared by first-class druggists, will also immediately remove grease spots from the most delicately colored silks.

TO TAKE GREASE SPOTS OUT OF BOARDS. Make a paste of fuller's earth and hot water, cover the spots with it, let it dry on, and the next day scour it off with soft or yellow soap.

TO REMOVE GREASE SPOTS FROM BOOKS. Moisten the spot with a camel-hair pencil dipped in spirits of turpentine; when dry, moisten with spirits of wine.

Green Fallow, green crops plowed into the soil.

Greenhouse, a building with a glazed roof in which plants are kept in pots and arranged on stages in a manner pleasant to the eye. A structure of this kind should not be placed where it will be much exposed to the prevailing cold winds. A south or east exposure is best. The foundation may be made of stone, brick or wood. A wall of stone or brick should go below the frost, and be laid in mortar made of stone lime and water lime of equal parts, with the proper amount of clean, sharp sand. A good stone wall will be lasting, but it will carry off much heat from the building. It might be furred with a thin layer of wood, or lathed and plastered, using some water lime. A solid brick wall for a greenhouse, in the climate of Central New York or Michigan, will last but a few years. Further south they are said to answer for the south and east walls. The heat and moisture within, and the cold without, cause the brick and mortar to crumble and give way. A hollow, ten-inch wall of two tiers of brick bound together with strips of iron is warm and durable if made of good hard brick. Walls of wood are cheapest, dryest and warmest, and if well made they are often more durable than walls of stone or brick. For such a wall, posts are used of cedar, chestnut, locust or even oak, blue ash, or red cherry, set deep and firm. Such a wall will last 20 years or more.

The cistern should be large enough to hold all the water which falls on the house during the year, so that none be wasted. As we are using water most of the time, the cistern should have about one cubic foot of contents to three or four square feet of ground covered by glass and potting room. We prefer them to be built under ground, of bricks, arched over, just outside the house or under the center of it. They are often built under the center stage, and covered with planks, upon which rests the pots or a stage to support the pots. In this case the walls are about two and one-half feet above the path. If such a cistern is left partly uncovered, the water soon becomes nearly as warm as the air of the house. Lead pipes run from the gutter or eaves-trough, underground to the cistern. If the cistern is outside or below ground, there should be a large open tank, made of boiler iron, cement or planks in the house, to contain water until it has become warmed by the heat of the house. Water for plants should be at least as warm as the air of the house in which the plants grow. Above this tank should be a good force pump, with hose enough to reach any part of the house, to enable two men to shower the plants whenever desired.

Designs for glass structures are almost endless. They are known as double-span roofs, having a roof of equal extent on each side; as lean-tos, with the roof all sloping one way from a high wall or building; or as a two-thirds or three-fourths lean-to, in which one of the walls is higher than the other, and the rafters are longer on one side of the house.

A lean-to is cheapest, but for most purposes a double-span roof is the best. The latter, if running north and south, gives an equal distribution of light, so the plants grow symmetrically without being turned around every little while. A lean-to or two-thirds lean-to is rendered warmer with the same heating apparatus, on account of the protection of the high walls from the cold winds. The lower the houses are made, the better, provided they are high enough to afford room for the plants. In very high houses the air at the top is so much warmer than that near the ground that it is almost impossible to heat them suitably for plants, unless the plants are also elevated on a high stage near the glass. Plants "draw" or grow slender when grown far from the glass. Every man of experience will now say, Build low. For ordinary purposes, nine to twelve feet is enough for the extreme height. For good work, without regard to appearance, six or seven feet is much better. If a number of houses are to be erected, they can be joined in any way to suit the locality or the taste of the designer. If much extended in a line, they make a greater display, at the expense of economy in fuel. For mutual protection and convenience, it is better to place the houses close together.

It is a good way, now quite popular, to build three houses, with double-span roofs, running north and south. These are joined side by side with a house for potting and packing (with furnace below) running along the north end. This room on the north affords protection from the cold, does not obstruct the light, and permits the gardener to pass from one house to the other without exposure or opening of outside doors. In England and Ireland many of the best houses have a framework of iron or copper. They present a fine appearance, are stout, durable, and do not obstruct the light, or harbor insects. Some have been tried in various places in this country, but so far as we have been able to learn, all have failed to give satisfaction, on account of the great extremes of our climate. These changes cause the glass to break, and the frame work conducts away the heat too rapidly in cold weather. We are not aware that any of the latest improved English patents have been tried in this country. Our best builders universally condemn a metallic frame.

Choose glass about 10 inches one way, double thick, and quite flat, so as to make tight joints. In curvilinear houses, have the glass 8 by 10 inches where the curve is greatest, and 10 by 14 or 16 inches where the curve is least, all the sash being 10 inches apart. None of the glass in this case need be bent, but imbedded in soft putty made of kiln-dried whiting and white lead mixed in oil. Each glass is fastened with four zinc shoe nails half an inch long. One of these is placed at the lower edge on each side, to keep the lower glass in place and the upper glass from sliding down; the other two are an inch and a half farther up the sash. The sash are one-sixteenth of an inch farther apart than the width of the glass. No putty is now used on the outside by the best builders, but some thick paint covers the upper edge of the glass, running on three-sixteenths of an inch. In England some of the best houses are now made without any putty or lap of the glass. They are free from drip, and permit any pane to be removed without disturbing those near it. Portable greenhouses are there quite common. Ground glass is liked by some to obscure the light in summer, to prevent the plants from burning. They break more easily than plain glass, and they do not give so much light in winter, when we usually want all we can get. To obscure glass in long, hot days, whitewash of lime is often used; but it acts unfavorably upon the sash, paint and putty. Indigo in hot water or linseed oil is cheap, easy put on, and answers a good purpose. Whiting in oil is nice. A favorite with many for nice houses is sugar of lead ground in oil and diluted with turpentine. Take but little at a time on the brush and put on thin; before dry, dust or dab over with a light, dry brush, to break up the lines in the covering. Any of the above can be easily removed in autumn, especially with the aid of a little pearlash water. Some fix up curtains of muslin, tacked to the sash inside, or placed on rollers. Some have curtains outside, made to roll up under a cover on the ridge of the house. You can have a huge blind made like a window blind, of 7-inch boards, the whole large enough to cover one side of a commercial plant house. You can close them at night to save heat, and open to any extent during the day to get just as much light as you want.

Double glazing is not very common, though it saves much heat. The snow will not so readily melt off in winter; dust and dirt and insects get in and look bad. It works well in perpendicular walls. Double glass for a third of the way from the bottom is most needed, where the air is coldest. The inside glass need not lap or be puttied. The glass may slide in from the top, and be removed for cleaning or replacing when broken. All nice houses above eight or nine feet in height should be supplied with King's patent apparatus to open the upper ventilators. It opens them all at once, to any extent desired, or closes them and holds them securely wherever placed. English sliding sashes for ventilation are clumsy affairs.

A curvilinear roof has some advantages. It is more ornamental. The light is better because the angle at which it strikes the glass is more varied. Such a roof gives head room next the sides of the house, without great height at the center or next the wall of a lean-to. The roof is stronger, and needs no center posts in a room twenty-five feet wide. It may be kept from spreading by half-inch rods running across from rafter to rafter, with right and left screws in the middle to arrange the tension. Paint the rods of the same color as the sash, so as not to be conspicuous. When well built, curved roofs are much more expensive, and, except for their finer appearance, straight slopes are preferable, all things considered. The cost of a house with curvilinear roof, heated with water, and stages for plants, is $2.50 to $3.00 for each square foot of ground covered. This does not include the cost of masonry. Houses with straight, double span roof, made plain and substantial, heated with water, and stages in, will cost from $1.50 to $1.90 per square foot, besides masonry. If made low for propagating, and posts of wood are used, they can be made and heated with water complete for about a dollar per square foot. If heated with flues, such a house will cost 45 to 60 cents a square foot. The curve for a curvilinear roof should not be just one arc, but it should curve most rapidly about one-third of the way from the bottom or wall. This allows a good slope for the upper part of the roof, to prevent drip. The rafters are about three by six inches, cut from the timber with the grain, framed together and bolted, making one continuous piece from sill to ridge. They may make the lap in two ways, horizontally or vertically. In either case the joints will be covered by a five-eighths inch band on the inside and outside edges, well nailed.

The purlines are two by three inches, about six feet long, tenoned into the rafters and bolted into the opposite one end to end, and placed not over four feet apart. There is a beveled coping on top of the sill, to turn the water off and to serve for the ventilators to shut against.

Fig. 1 represents a neat glass structure, combining the straight and curved rafter. The side ventilators are hung at the top and open outwards. They are held in place by iron straps and pins; a screw eye holds the strap, one by one-eighth of an inch, to the ventilator; holes in the strap catch on an iron pin in the sill. All side ventilators are best when made to

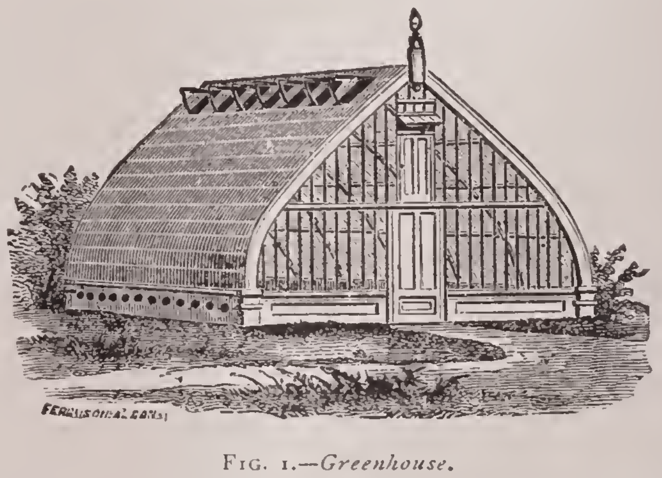


Fig. 1.—*Greenhouse.*

open under the side shelf and over the pipes or flues, so as to warm the air before it strikes the plants. Similar doors may be hung from the side beds in the house. The flues are often boarded up, to secure good bottom heat for the plants on the side shelves.

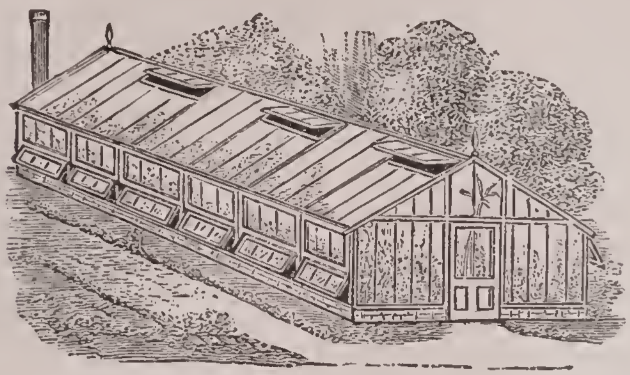


FIG. 2.—*Ventilators.*

Sash bars for a curved roof should be one by one and a half inches, cut on a radius to conform to the rafters, and well nailed in the grooves of the purlines. These bars run only from one purline to another. The plates are two by four inches. The gutter is of wood, about four and a half by three inches in width, the ends put square together with a piece four inches long and five-eighths wide, curved galvanized sheet-iron driven into both ends of the pieces which meet. The gutters are held in place by a bracket, which is useful as well as ornamental. In the winter place a foot-board over the gutter and let it rest on the sash above. Tack it fast. It will be found to keep ice from accumulating in the gutters.

The shelving for all greenhouses may be made of open slats or tight-matched inch boards. The side shelves are about three feet wide, with a light strip on the edge to retain sand to set pots on. The legs of the shelves should rest on stones or bricks. The paths are about three feet wide, and best made of grout, a trifle rounding to let off the water. Some are made of slats of wood. In a long lean-to for ornamental purposes, a winding path gives great variety, and keeps small parties out of sight of each other. In the center of a wide house there may be a stage with shelves rising towards the center, with an average slope about parallel with the rafters. Some build an eight-inch brick wall within the paths and fill the space with earth for plants. The walls must be tied with iron rods running across the bed.

It is impossible to describe a tenth part of all the tasteful fixings seen in houses managed by skillful persons. These consist of brackets, rock work, trellises, rustic seats, grottoes, fountains, aquaria, fancy pots, etc.

The heavier parts inside, above the stages, are beautiful when painted pearl white, and the sash a light sky blue. The legs of the stage may rest on a flat stone or a few bricks. The wood-work should be well painted, and all joints are better if put together in green paint.

Greenhouses are very apt to have too much wood in them when built by common mechanics. They should be made as light as is consistent with strength. Heavy ornaments are all out of place.

Propagating is mostly done in low, narrow houses, placing the cuttings in sand which is on the stage. As before remarked, the space under the stage or shelf is usually boxed up, to keep the sand much warmer than the air above it, to secure what is called a good bottom heat. This is very essential to good success, and too often overlooked or forgotten. There is nothing new in this fact, as it was well known 40 years ago, and perhaps a hundred. Shelves or benches for this purpose are usually made of wood, sometimes of slate. Some prefer vats containing warm water. They are more expensive, and will not last over six or eight years. Good vats can be made of water-lime cement, held in place by boards till sufficiently hardened. A vat of wood may be made as follows: Lay a tight shelf or bench three feet wide along the side of the house, selecting the best pine stuff 1¼ inches thick, tongued and grooved, and carefully put together in green paint. Place a piece 2½ or three inches wide, one edge up, along the front edge and back edge of the shelf, and across the ends; also one along the middle. The middle strip does not extend quite to the farther end. On these three parallel strips place another tight shelf, with edges 3 inches high, upon which place 1½ inches of clean sand, to contain the cuttings. This must never get above 70° for most cuttings. Tap the flow pipe and conduct it into the side of the vat near one end. The water, 1½ inches deep, after passing down one side of the vat and back the other, will pass out through another pipe into the return to the boiler. To check the heat, place a little block partially over the upright flow pipe where it enters the vat. If much over 80 feet long, the water gets too cool before leaving the vat. Fifty to 60 feet, or any shorter length will do.

A LEAN-TO is a kind of greenhouse often used, but the light is all from one side, and not so good for the plants unless they are frequently turned around. A neatly constructed greenhouse, attached to a dwelling, and partaking somewhat of the nature of a lean-to, with but little of its disadvantages, is shown in Fig. 3.

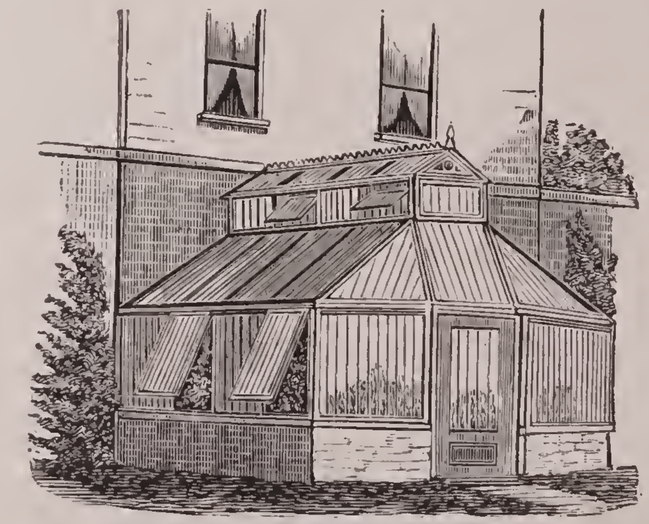


FIG. 3.—*Greenhouse Attached to a Dwelling.*

A very cheap one, easily managed, may be made as follows: Just beneath a sloping outer cellar door may be placed a few sash and glass. On warm days, or at all times, except nights and very cold weather, the wooden doors may be open. Some plants will do very well in such a place. One can be made on a much larger scale, on the same plan, which can be entered through the cellar or from the house above. A saddle boiler is used, arched all over with brick, which grows smaller as it becomes a flue and enters a large chimney, which also answers for other fires in the house. It needs very little care. The boiler also has some pipes attached for warming with water. It takes about 2½ cords of 3-foot wood for a year.

A portable, dwarf span-roof greenhouse, for setting over asparagus, rhubarb, grapevines, tomatoes, etc., to keep off frost and retain heat in spring or autumn, can easily be made. Doors on hinges may be made, to cover the glass quickly in cold weather. The cost is about one dollar per foot, three feet wide.

HEATING APPARATUS. Steam is now seldom used for heating greenhouses, as it requires more attention, and there is more danger than when warm water is employed. Heat does not circulate until the steam is generated, while water begins to circulate as soon as the temperature rises one degree. Warm water is safest; there is no danger of gas or explosion, the heat is not excessive anywhere, but evenly distributed. There is something injurious and unpleasant about a high heat of flues or iron pipes. The labor of tending fire for warming by water is very little, an item of no small account in a large house. The cost of boiler and pipes is the greatest objection to their use. Water is best for large houses; many prefer brick flues for small ones. The boiler should be large enough to contain a great body of hot coal, and not need hurrying. The flow pipe must come out at the highest point of the boiler. Most builders put up pipes so the flow pipe slowly rises from the boiler to the extreme end, where there is an expansion tank; from here the pipe returns below and parallel with the flow pipe, and enters the lower part of the boiler. One man arranges the flow pipe to slowly descend, and the return pipe also, through the whole length. It works well. His reasons for this arrangement are—that after leaving the boiler the water grows colder, and heavier, and naturally falls, to make room for the lighter warm water. The fewer turns in the pipe, the better. After many years of experience, an authority gives the following rule for the amount of 4-inch pipe to heat a glass house well made: For a temperature of 40° to 45°, with outside at 10° to 15° below zero, we need one foot of pipe to every four feet of glass exposure; for 65° to 70° we need one foot of pipe to every three feet of glass. The boiler should be four to eight feet below the level of the house, though this is not essential with all heaters. The pipes at each joint rest on brick piers carefully made. Houses on low ground may have the pipes descend and then rise to pass under a sill, but this is thought objectionable. For farther details, consult almost any catalogue advertising heating apparatus.

FLUES have long been used. They are very simple in construction. The bottom is made of bricks and tiles, a foot one way, held up on bricks or stones to allow the heat to escape; the sides are made of two or three bricks above each other on edge; and the top is covered with tiles. The flue should gradually rise for its whole length. The mortar should be thin and the bricks damp, so that no joints will be left for pointing. Well puddled clay makes a very good mortar. Tiles a foot square often have a notch along one edge to overlap a notch in the previous tile. The little furrow on top should be filled with mortar. A brick furnace may be made and set two or three feet below the flues. The door should be just outside the glass house and open into the shed near a coal bin. If for coal, make for a moderate-sized house, a furnace 1½ feet wide, 2½ feet high at the center of the arch, and 2 feet deep, and lined with fire bricks. If for wood, it must be longer and some larger, depending on the size of the house. The arch needs an iron front, with two doors, one for fuel and one for ashes. Iron grates to hold up the fuel are desirable. It is generally thought impracticable to make flues work well if much over 120 feet in length. On the flue should be placed several large, long pans of water, to afford moisture. Instead of bricks for the entire flue, after about 20 feet, flues are nicer and better made of large cement drain pipe; they crack and give out heat too freely for placing near the furnace. A saddle boiler is sometimes used, uniting the heating by flues with that by water. It is a very economical and satisfactory way of heating small houses.

To FUMIGATE a greenhouse, a cheap and convenient method is to set a large flower-pot, containing some dry tobacco, upon two small, inverted flower-pots, which are as far apart as may be to hold up the larger one; invert another large flower-pot, same size as the other, over it, and placing a burning candle underneath, so that the tobacco will be kept smouldering, without blazing.

Kindred topics are Floriculture, Gardening, Window Gardening, Hot-bed, Cold Frame, etc.

Green Crops, crops which alternate with the cereal grasses in regular rotations, or which admit of the cleansing and ameliorating cultivation called the green fallow.

The term green crops is sometimes employed in a large sense, to designate all cultivated esculent plants which are used in a green or ripe state; and in this sense, green crops comprise the greater portion of the ordinary productions of the kitchen garden.

Green Fly, any of the green colored species of aphides which infest peach-trees, plum-trees, cherry-trees, or the shrubby plants of the greenhouse or the conservatory.

Green Food, cut or gathered esculent plants, used in their fresh or succulent state. It differs from fodder in excluding all dried substances, and from pasturage or herbage in being consumed in the house. See the article Soiling.

Green Manure, vegetable substances incorporated with the soil in their succulent state, to act as fertilizers for subsequent crops. They may be either entire plants or parts of plants; either weeds or parts of cultivated crops, or the whole of cultivated crops; either the produce of waste grounds carried to arable fields, or the refuse of any kind of useful produce, or specially raised upon the spot with the express design of being used as a manure; either used some little time after becoming dead, but before losing their succulency, or buried in the soil by the same act or process which destroys their life.

Vegetables returned, partly or wholly, into the soil in the same condition in which they have grown out of it might seem, to an unreflecting person, or to one unacquainted with agricultural chemistry, utterly incapable of acting as fertilizers; and certainly, if they derive all their substance out of the soil, and were to return it in the same state of chemical combination and with the same play of chemical affinities in which they derived it, they would give back exactly what they received, and affect the soil in no other manner than by the accessories and accidents of their culture. But by far the largest portion of their bulk is derived, not from the soil at all, but from air and water, and the whole of this is contributed by green manure as clear gain to the soil, or as prepared and ready aliment for the succeeding crop; and the remainder of their bulk, though extracted from the soil, is brought into new affinities, and more practicable ones than before, so that even this, as returned to the soil by green manure, is in a condition for more rapid and advantageous assimilation than if it had not recently played a part in vegetable growth.

Green manure, though a very important, facile and powerful means of enriching the soil, and though known in some forms to the ancient Romans, and practiced in others by very many farmers of the present day, has received but very little attention from scientific agriculturists, and is even unrecognized in name by very many cultivators.

Specific green manure may be regarded as at present practically unknown among the farmers of Great Britain; residual green manure from cultivated plants is known principally in the form of breaking up lea grounds and plowing clover lands, and partly in the practices of kitchen gardeners, namely, in the plowing in of the leaves and tops of turnips; and incidental or waste green manure is known only in such a fitful and scattered manner as places it beyond the limits of all system.

Greens. Nearly all sorts of vegetables and weeds have been used for greens in man's eagerness in early spring for something fresh grown. The following are the best in the order of their dietetical quality:

Asparagus, turnip and cabbage sprouts, beet tops and spinach, mustard and horse-radish tops, salsify tops, purslane, yellow dock and rhubarb, cowslips (Caltha palustris), young poke, lamb's-quarters, dandelion, potato tops, etc. When boiled enough they will sink to the bottom. When cooking them mixed, do not put the very tender kinds along with the tougher or older. If you have not a piece of salted meat with them, put in some salt.

Greyhound, a slender, graceful variety of dog. See Dog, page 308.

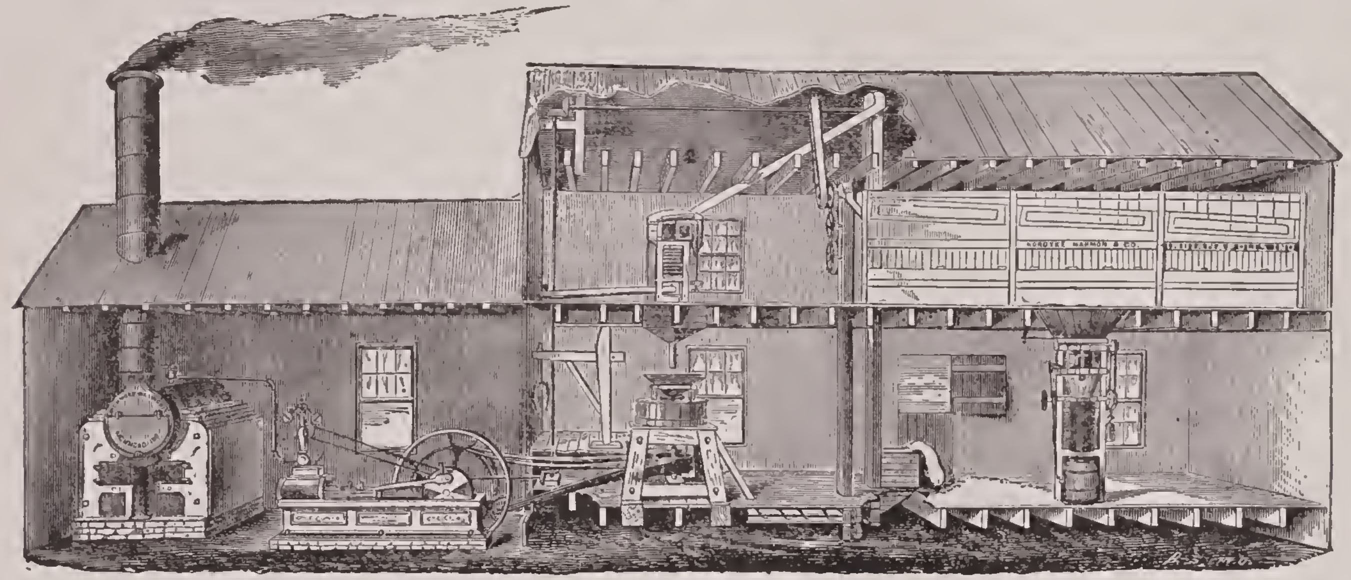
Grinders, the large teeth used for mastication. See articles Cattle and Horse.

Grindstone. The grindstone is an important adjunct to the farmer's outfit, and the selection of good ones requires knowledge and care. When it is possible, grindstones should be large, and turned by some power stronger than human muscle; for there is no task more irksome, especially to boys, than turning a grindstone, when a 200-pound man is laying his weight on the instrument that is being ground. On ordinary farms, wind, dog and horse power can be employed to turn grindstones. Where hand-power is used the stones should be of moderate size. The best stone for all purposes is moderately hard and of even texture, to prevent the stone becoming uneven. It should be carefully hung, and well centered to prevent wabbling and thrusting. The axle should turn on rollers, or in metal boxes. For heavy work, such as grinding scythes, axes, and large tools, a stone two feet in diameter is small enough, and should be turned by a power equal to that of a strong man; but when small tools are to be ground, such as knives, small chisels, etc., a smaller, finer stone can be used, and driven by a treadle. Grindstones should never remain in a trough of water. When the stone is still, the part in the water becomes soft by soaking, and wears unevenly. It is better to place a vessel of water on a frame at one end, and make a smale hole in the vessel, so that a small stream will spout out upon the stone while turning, plugging it up when not in use. Whenever the stone has become irregular, it may be made perfectly round again by fixing an old chisel, or other blade of steel, to a frame, so that the straight edge of the blade will rest at right angles upon the stone. One end of this frame should work on a hinge fastened to an upright, so the frame will rise and fall with the irregularities of the stone. The other end of the frame should rest upon an upright when the blade is on the lowest depression of the stone's surface. This will prevent any cutting of the depressed portions of the stone, and will permit the cutting of the stone down to a perfect circle, with the diameter the same as the lowest portion. Do not allow the stone to get out of order, but keep it perfectly round as above directed. Clean off all greasy tools before sharpening, as grease or oil destroys the grit.

One of the commonest acts of negligence which causes a farmer expense and a great deal of vexation, is that of setting the crank of the grindstone in so loose and slovenly a style that it strikes the frame and and is broken off.

ARTIFICIAL GRINDSTONES can be made by taking pure, white sand, 5 parts; shellac, 1 part; melt, and form into the proper shape while warm. The fineness of the sand must depend on the work the stone is intended for. Pounded emery may be substituted for sand. The same composition is formed on pieces of wood, for the purpose of sharpening knives, cutting stones, shells, etc.

To Measure Grindstones, multiply three-fourths of the square of the diameter by the thickness. Example: How many cubic inches in a grindstone 22 inches in diameter and 4 inches thick? 22 times 22 are 484; ¾ of this is 363; 4 times the last are 1,452, cubic inches, the answer.


NORDYKE MARMON & CO.
INDIANAPOLIS IND.
Fig. 1.—*Portable Mills.*

Gripes, is sometimes applied to colic, which see under Horse, and page 257.

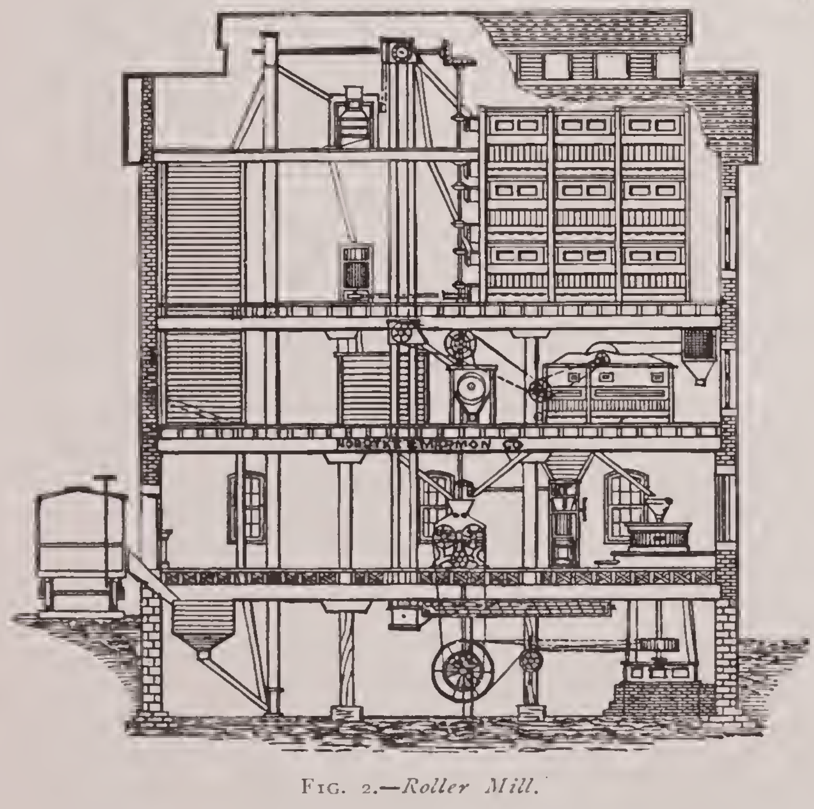


Fig. 2.—*Roller Mill.*

Grist-Mills. The ordinary grist-mill at the present day are driven either by steam or water power. Wind and water power were the motive powers used by the ancients, but whatever changes have been made in the moving power and the various apparatus of the mill, the grinding is done in the same way. Two circular stones, placed very near to each other, are still employed. The mills illustrated in this article are known as portable mills, and are small and may be run to advantage in any good neighborhood. They are made and sold by the Nordyke & Marmon Company, of Indianapolis, Ind. Either run of burrs can be stopped or started, as needed. The outfit comprises one wheat mill, one corn mill, one flour bolt, conveyors, etc., one double-suction smut machine and screen shoe, three sets of elevators with belts, cups, etc., scales, picks, bag truck, etc.

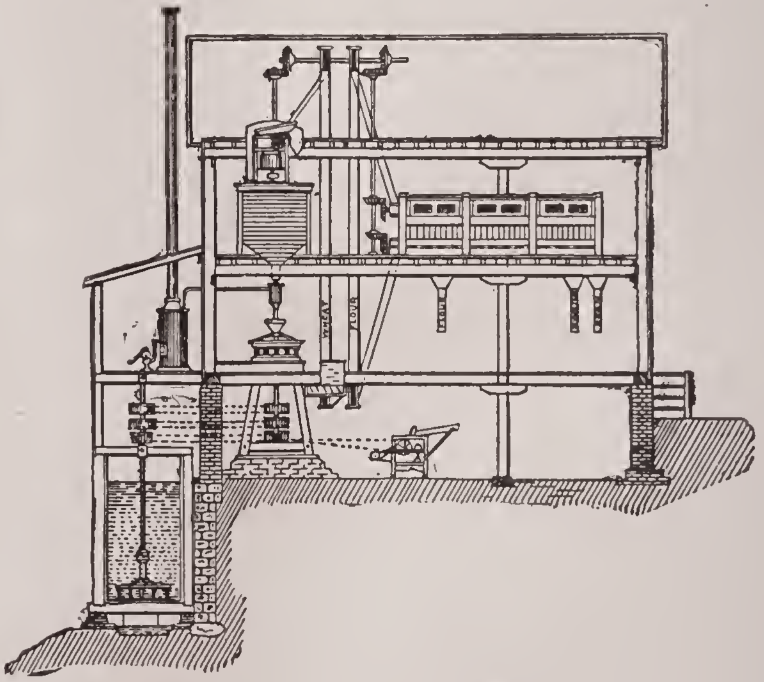


Fig 3.—*Water-Power Mill.*

Fig. 2 gives a sectional view of a roller grist mill. A study of it reveals one feature after another, all tending to exhibit in a grand result the neat and convenient system which modern milling science has attained.

Fig. 3 presents a like view of the mill as run by water power. In contemplating the erection of a mill, one is inclined to believe he can procure one thing of one party and another of another, and work them all in to advantage; but the further he proceeds with his task the more entangled and vexatious it becomes. It is, therefore, more satisfactory, as well as cheaper, to engage some responsible party who supplies all the appurtenances of grist-mills, and especially one who furnishes competent millwrights to put up the mill, and make good all guaranties.

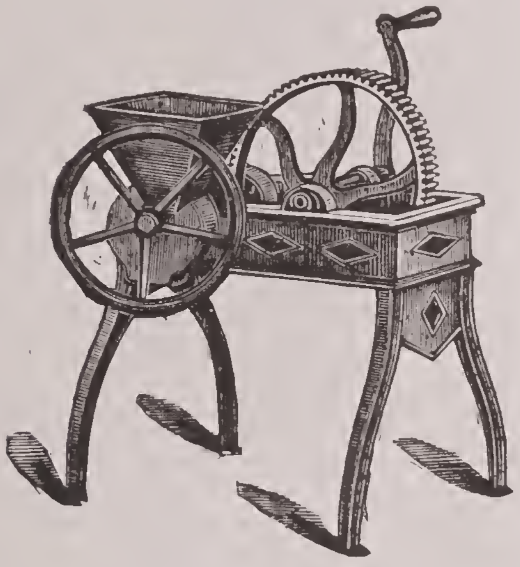


Fig. 4.—*Combined Hand and Power Mill.*

Hand and Power Mill. It is a great luxury to have fresh-ground meal, either corn or wheat, for bread, mush, puddings, etc. Between the meal from a hand mill, cooked and served the same day it is ground, and that which is generally sold at the supply stores in town, there is as great a difference, both in flavor and healthfulness, as there is between fresh vegetables from the garden, cooked and eaten immediately, and the old, dirty, wilted, immature stuff we find in the city market. Hand mills, ranging in price from $3.50 to $25 can be obtained through hardware dealers. L. J. Miller, of Cincinnati, O., is one party who makes them. Fig. 4 represents a combined mill, weight 100 pounds, and price $25; capacity one to three bushels per hour.

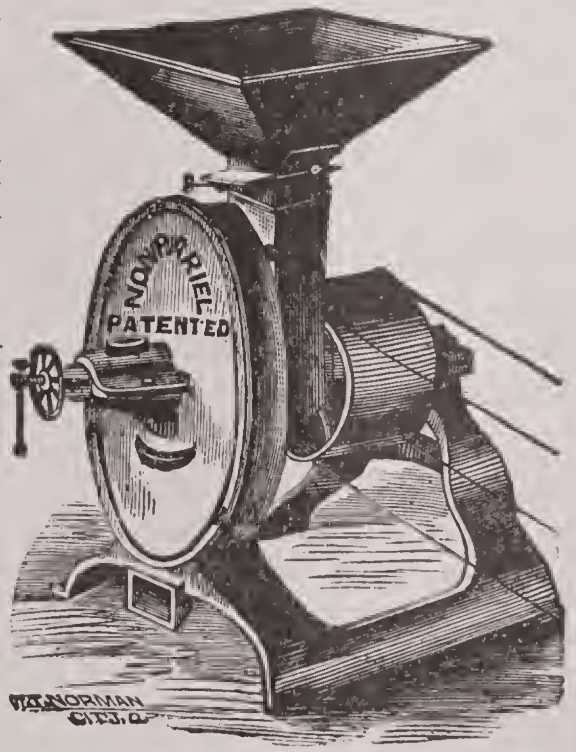


Fig. 5.—*Grain, Spice and Drug Mill.*

The same party also manufactures a fine power mill for grinding drugs and spices as well as grain, Fig. 5. This mill will run equally well either way—right or left—and can be attached to any kind of power, steam, wind, water or horse. The plates are made of the hardest white iron, ground true with an emery wheel. One pair will last for five to eight years for farm use, and when worn out are easily replaced. See also Feed-Mill.

Grit or **Grits,** the coarse part of meal; oats or wheat hulled or coarsely ground; groats. (The word has other meanings.) All the grains have been variously hulled, cracked, ground and cooked, and sold under a variety of fancy names.

Groats (grawts), oats or wheat deprived of the hull or outer coating.

Groin, the depressed part of the body between the belly and the thighs. Whenever there is chafing in the part, either with adults or with children, dust it with corn starch· if that is not at hand, take common flour.

Groom, a servant who attends to the stable, and feeds, grooms and litters horses. He ought to possess a thorough knowledge of the wants and habits of the horses, to exercise much patience and skill in the management of the particular animals in his charge, and to practice regularity and care in the performance of his several duties, both upon the animals themselves and upon their stable.

Grooming, the combing, brushing, and hand-dressing of a horse. Every horse which is kept much in the stable, or is highly fed, or is little worked, requires grooming as a substitute for out-door exercise, and every horse which is demanded by taste or fashion to have a spruce and glossy appearance, requires grooming as the only healthy means of maintaining a healthy "coat." But the curry-comb needs to be but lightly applied to any horse, and not applied at all to a horse with thin or tender skin; and a soft brush or even a hair cloth, aided by a little additional pressure of the hand, will, in many instances, effect all the purposes of an efficient grooming. A farm horse, or any horse whatever, which is hard-worked during the day and turned into the field at night, would be injured, rather than benefitted, by any further grooming than the mere brushing of the dirt from his legs.

Gros-grain (gro-grain′) or **Grogram** (grog′ram), a kind of coarse stuff made of silk and mohair; also, a kind of strong, coarse silk.

Ground-Bait, bait consisting of balls of boiled barley, etc., dropped to the bottom of the water to collect together the fish.

Ground-Cherry, a common, hairy weed, bearing edible berries within inflated pods.

Ground Hemlock, a species of creeping yew growing in the Lake region.

Ground Ivy, a catnip-like, creeping plant, common in some door-yards; gill-over-the ground.

Grove, a small and ornamental wood. An open grove consists entirely of trees, and a closed grove, in addition to trees, has either an environing or an underwood shrubbery. Groves admit of a vast variety of forms and arrangements, and may be made either principal or subordinate features of a scene; but whenever they are intended mainly for shelter, or often when intended principally for picturesque effect, they ought to have their trees, not in rows, but at scattered distances.

Grouse are beyond all question the finest game birds of which we have any knowledge. The true grouse are confined to the northern hemisphere, and attain their greatest development in North America, no less than nine well marked species being natives of this country. The grouse may be distinguished from any of their relatives by the more or less dense feathering of the tarsus and the groove for the nostril, by the presence above the eye of a strip of naked yellow or red skin, and by the pectinated margins of the toes. In addition to these peculiarities several species possess curious tufts of feathers on the side of the neck, and some have under these feathers air sacks which are capable in the breeding season of great distention.

CANADA GROUSE, SPRUCE PARTRIDGE. The Canada Grouse is a northern species nowhere very abundant. Its favorite haunts are the dense swamps of Canada, Northern Maine and the Adirondack region, where grow the pine, spruce and tamarack, on the buds and leaves of which it feeds.

DUSKY GROUSE, BLUE GROUSE, GREY GROUSE, MOUNTAIN GROUSE, PINE GROUSE, FOOL-HEN. This species is certainly one of the finest birds of its family. Its flesh is almost entirely white,—as much so as the Ruffed Grouse or quail, and has a peculiar tenderness and flavor. The breast is remarkably full, and the whole body compact and plump. The feathering is close and thick, wings and tail short and square, the latter a beautiful fan when spread, like that of the Ruffed Grouse. Its food and habits are nearly the same as those of the latter bird, consisting of insects and the berries and seeds of the pine cone, the leaves of the pines, and the buds of trees, etc. It has also the same habits of budding in the trees during deep snows as the Ruffed Grouse, which are so often shot while thus engaged on winter moonlight nights in the orchards of New England. With the Blue Grouse, however, this habit of remaining and feeding in the trees is more decided and constant; and in winter they will fly from tree to tree, and often be plenty in the pines when not a track can be found in the snow.

The nests of the Dusky Grouse are upon the ground, usually well hidden in a thicket, and the broods about one-third larger than those of the Sage Hen, generally from twelve to fifteen in number. The eggs are of a creamy white color, speckled all over with dots of chocolate brown.

The Blue Grouse is more or less abundant throughout the Rocky Mountains, extending northward to Alaska, and south nearly to Mexico. It is perhaps nowhere more numerous than in Montana, in which Territory one may sometimes see twenty broods in a day's travel.

SAGE GROUSE, COCK OF THE PLAINS. This species is the largest of the North American grouse, and yields in size only to the giant Cock of the Woods, of Europe. In the early season, that is, in August and the first half of September, it furnishes fine sport, for it lies well, and when it rises flies so straight and steadily that it is very easily secured.

The male bird is over two and one-half feet long, and weighs seven pounds or more; indeed, specimens are sometimes said to attain a weight of over ten pounds. The upper parts are variegated with black, brown and yellowish grey; the sides of the lower part of the neck are whitish, and are furnished with curious stiff feathers, each of which terminates in a long hair or bristle. The lower part of the breast and the abdomen are black. The females and young males of the first autumn are smaller and lack the stiff neck-feathers of the old males. Such in brief are some of the characteristics of this fine grouse.

The Sage Grouse is an inhabitant of the high, dry plains of the interior, which are covered with a more or less thick growth of the sage brush (Artemisia tridentata). On the leaves and buds of this shrub the grouse chiefly feed, sometimes varying their diet with grasshoppers and berries, or the buds of the willow and greasewood.

During the summer and autumn, the Sage Grouse congregate in packs of from ten to twenty, usually all members of the same brood. At the approach of winter, however, the packs become very large, several hundred being sometimes found together. At this season they are very wild.

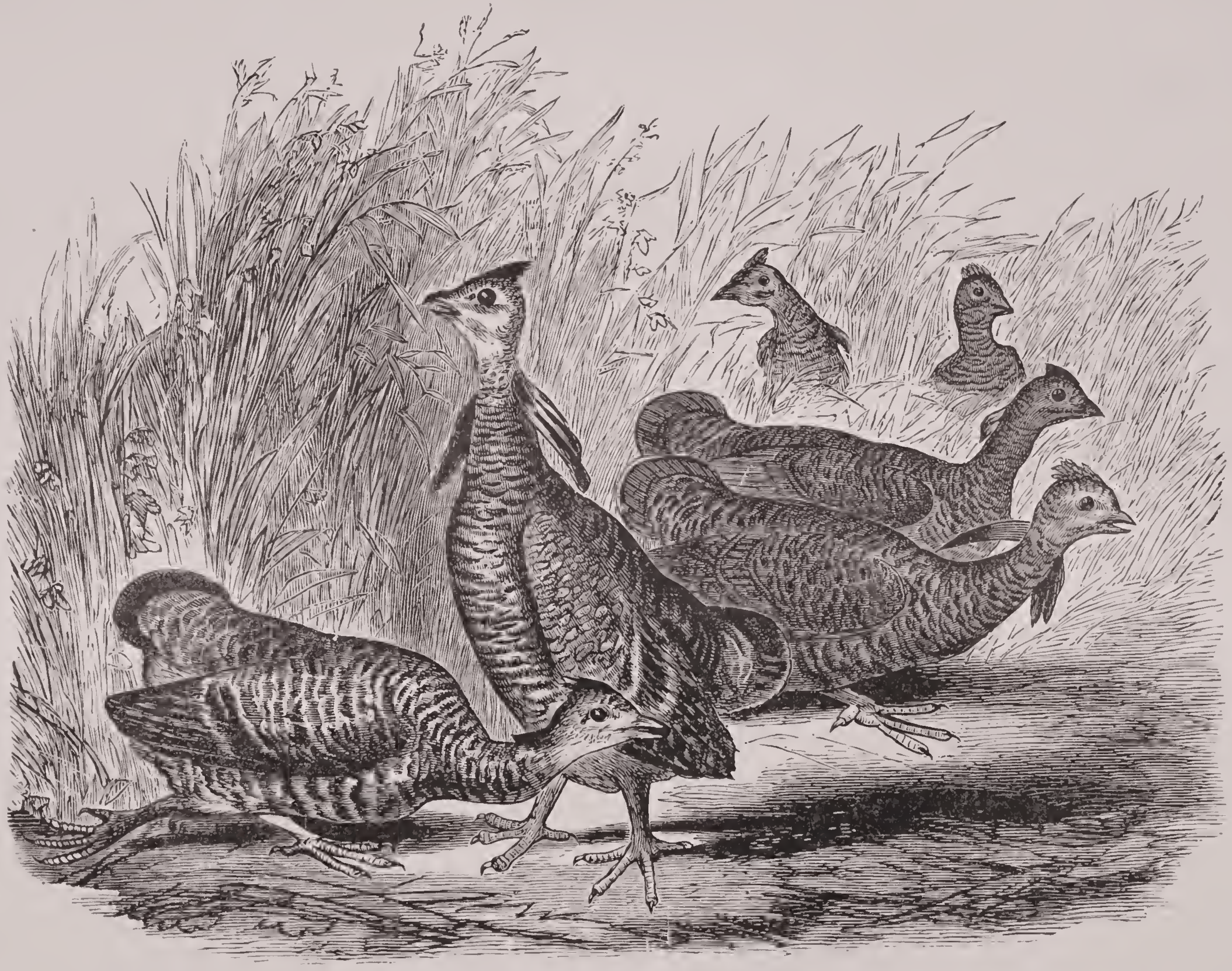
The broods pass the night on the uplands, coming down to the water morning and evening, and retiring to the higher grounds again without much delay. The sage grouse are said to spend the night upon the ground, roosting together much after the manner of the common quail.

SHARP-TAILED GROUSE, SPRIG TAIL, PIN-TAIL, WHITE BELLY. The range of the Sharp-tailed Grouse is quite extended, for it is found from Alaska on the north to Kansas on the south, and from Michigan to the Sierra Nevadas and the Cascade Range.

The prevailing colors of the Sharp-tailed Grouse are a clear dusky black above, and pure white beneath; upper parts variegated, with transverse, rather zigzag spots of yellowish brown; wing coverts with large rounded, and outer webs of primaries with smaller and more quadrate spots of pure white; breast thickly covered with broad V-shaped, and the sides with less numerous, sagittate marks of uniform clear slaty or dusky; legs densely feathered; throat thickly spotted with dusky; the two middle feathers of the tail one inch longer than the others.

In size, this species about equals the well known Prairie Chicken or Pinnated Grouse, and altogether is one of our finest game birds.

An interesting fact in the history of this species, is that it seems to retire before the advance of the settlements, while its place is taken by the Pinnated Grouse. Thus in Minnesota, where formerly the White-bellies abounded, and the Prairie Chicken was unknown, the former are now becoming each year more scarce and the latter more abundant. The Pinnated Grouse seems to follow the husbandman, and to be far less wild and untamable than the Sharp-tailed.



PINNATED GROUSE, or PRAIRIE CHICKEN.

It is said that in entering a wheat field the Sharp-tailed Grouse always flies, and thus cannot be trailed by a dog, but must be winded, while the Prairie Chicken always goes to feed on foot, and may thus be roaded up by a dog.

PINNATED GROUSE, PRAIRIE CHICKEN. No member of the grouse family is better known than the Prairie Chicken of the Western States, and none is more numerous or more eagerly sought for by sportsmen. This species is from eighteen to twenty inches in length. Its color is blackish brown, varied above and below with tawny; the under tail coverts and vent are white, and the throat buff. The sides of the neck are ornamented with little wing-like tufts of feathers (whence the name pinnated), and beneath these are two naked spaces, which in the breeding season, during the "tooting" of the male bird, are distended until they reach the size of an orange. The "tooting" is the call of the male bird, and is only heard during the early spring. At this season the grouse are great fighters, dashing at each other with more display than effect, and with little or no damage done on either side. This bird is found in open plains on which are few trees, but sometimes takes to the scrub oak for shelter. The nest is composed of grasses and leaves, built on the round under the shelter of a bush. The eggs are brownish white, often somewhat spotted, and from ten to fifteen in number.

A tuft of long, pointed feathers on each side of the neck covers a naked, orange-colored air sack, which is capable of great inflation. These air-sacks enable the males to produce the peculiar booming sounds which are always heard during the pairing season. When the air receptacles are inflated, the bird lowers his head to the ground, and, opening its bill, utters a succession of sounds, going from loud to low till the air of the sacks is exhausted; then immediately erecting itself, and inflating the sacks, it proceeds as before. These sounds may be heard a mile or more. We present a full-page illustration of this variety of the grouse on the preceding page.

The "Prairie Hen," or Pinnated Grouse, is lawful game in most of the States between the middle of August and the first of January, but the season closes in reality about the first of November, because the birds by that time have become so wild that but few care to hunt them.

Their flight is regular and swift, frequently, in October, flying several miles, then dropping down in the long grass. They fly less rapidly than the Ruffed Grouse, but like them, make a cluck just before starting. They resort to their feeding ground about daylight, and retire to the cornfields or fresh plowed fields to dust themselves, and come for their evening meal about four o'clock. They roost within a few feet of one another all the year, seldom roosting on trees, but generally take an open field, and sometimes on the fences. In the early fall their flesh is light, but after a few frosts the flesh becomes dark, and loses its delicate flavor. Unlike the Ruffed Grouse, they can be domesticated, and will pair and breed during imprisonment, and do not migrate like the other varieties. The grouse in the spring commences about April to "toot," and can be heard nearly a mile.

RUFFED GROUSE, PARTRIDGE (of the East and North), PHEASANT (of the South and Southwest). The Ruffed Grouse is of all our game birds the most difficult to kill, least domestic in its habits, and most particular as to the haunts which it frequents. The range of this grouse extends over the whole breadth of our continent, wherever there is wooded country, northward as far as the fifty-sixth parallel, and southward to Texas. Audubon says that there are portions of South Carolina in which it never existed, and it is doubtful whether it is found in the extreme southeast at all.

Nothing can excel the grace with which it moves upon the ground. It walks with a proud step, elevated head, the ruffs more or less raised, and its exquisitely beautiful tail partly spread. It poises a second or two on one foot, then on the other, and at almost every movement utters a soft cluck. If disturbed it lowers its head, spreads its tail wider, and runs rapidly into the thickest bushes. If there be no hiding-place near, it at once takes wing with the loud whirring which all have heard who have had the pleasure of visiting its favorite resorts. According to Audubon, these sounds are never heard when the bird rises of its own accord, but only when flushed by a real or supposed enemy. The flight is straight, rather low, and under ordinary circumstances not more than one or two hundred yards at a time. If, when flushed, it alights upon a tree, as is often the case in regions where it has not been much hunted, it will generally be found, if at all, on the side farthest from the pursuer, and close to the trunk, and standing so still and erect that one can readily mistake it for a stump of a broken limb.

Doubtless in point of flavor and delicacy the Ruffed Grouse may be awarded the palm above all other birds of the gallinaceous tribe.

The wide extent of country which the Ruffed Grouse (or Pheasant as they call it in some localities, or Partridge as they call it in others) inhabits, causes it to be well known in almost every section of the United States, and there are few sportsmen who have not toiled and been tantalized in its pursuit. Early in April the cock grouse begins his wooing, and perched upon some fallen log, commences his amatory drumming, calling to his side the unfortunate mate whose family duties he will soon refuse to share.

We present a fine picture of this species of bird on page 613.

PTARMIGAN, WILLOW GROUSE, PARTRIDGE (of New-Foundland). The various species of Ptarmigan are all alpine birds, and are found only in the north, and on the highest mountain ranges. They are to be distinguished from all other members of the Grouse family by the dense feathering of the tarsus and toes, by turning white in winter, and by the possession of only fourteen rectrices, or tail feathers.

Rock Ptarmigan, Mountain Ptarmigan. This species is still more boreal in its habitat than the preceding, and but little is known concerning it. It is never found within the limits of the United States.

White-tailed Ptarmigan, White Quail. The White-tailed Ptarmigan may be distinguished from all others of the genus by having the tail white at all seasons. It is the smallest of our Ptarmigan, and it is the only one of regular occurrence within the territory of the United States. In the winter this species is pure white throughout, but the summer plumage is curiously mottled with dark brown and tawny and white.

Grub, a larva which infests fields, orchards, and gardens and partially destroys the crops. The word is sometimes used so very loosely as to designate wire-worms, slugs, and almost all kinds of maggots which occur in the field; it is sometimes used less loosely to designate the larvæ of the most mischievous grass-eating insects, whether dipterous, coleopterous, or hymenopterous; and it is now more commonly, and with very obvious propriety, used in so restricted a sense as to designate only the larvæ of certain species of the coleoptera.

Gruel, a drink made of meal, or flour, and water.

Oat-meal Gruel. Put a pint of boiling water into a sauce-pan; stir in gradually two table-spoonfuls of oat-meal. When smooth, set to the back of the stove to boil for half an hour or longer. Season with salt, and strain before serving. Sugar may be added if liked, and a flavoring of nutmeg, lemon or cinnamon. Port wine is often used for invalids. Another very nice gruel is made by taking a little more oat-meal and adding a cup of sweet milk just before straining, after which the gruel must be simmered for ten minutes and seasoned to taste.

Corn-meal Gruel. To make a cupful of this, wet a tablespoonful of the meal with a little cold water, pour upon it half a pint of boiling water, and let it boil half an hour. Nutmeg, sugar and cream may be added if liked.

Arrow-root and Tapioca gruels are made in a similar manner.

Graham Gruel. Stir a spoonful of the flour into a pint of boiling water; boil about five minutes; strain it through a milk strainer, and season to taste. There are little strainers to be had which are made purposely for culinary work.

Ground-rice Gruel. Rub a tablespoonful of ground rice in a small quantity of cold water and stir it into a half-pint of boiling water; add a little salt, and let it boil up a half a minute. When milk is allowed, it is well to make the gruel of equal parts of milk and water.

Flour Gruel. Tie up in a piece of thick cotton cloth a coffee cup of white flour; boil it steadily for three hours, then remove the cloth and lay the lump where it will become perfectly dry. To use it, grate it and thicken two gills of boiling milk with a dessert spoonful of it wet in cold water.

Cracker Gruel is made of pounded crackers, with the usual seasoning.

Grunter, is applied to horses that give forth a grunting noise. One condition, giving rise to wheezing, roaring, whistling, piping, and rattling will, with slight modification, produce a grunter.

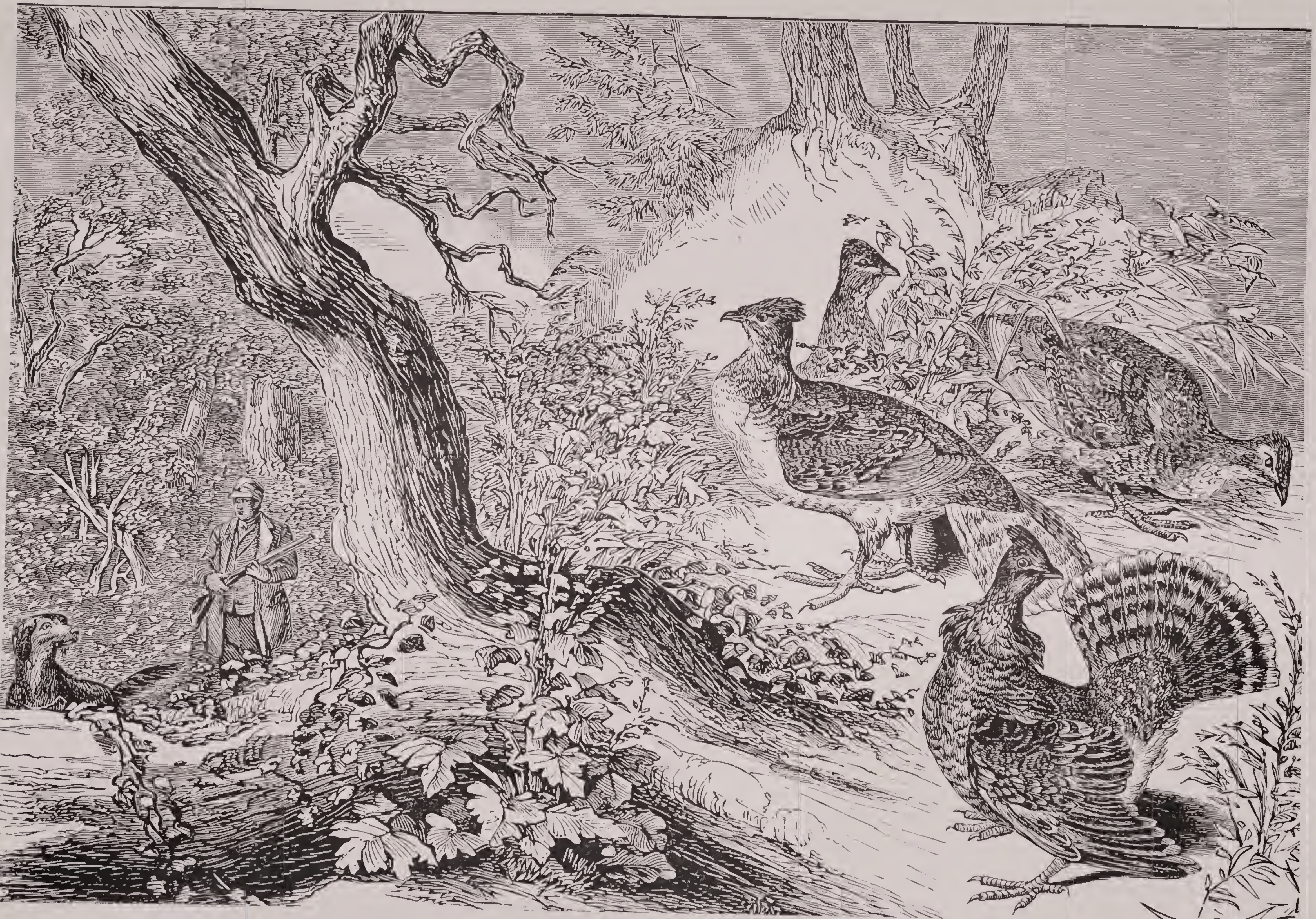
Guano (gwah'no), the excrement and remains of sea birds, which have accumulated for ages upon rainless, rocky islands of the South Pacific coast. When genuine, it is one of the most valuable of the special fertilizers.

In the prevailing native language of Peru, the word *huana* signifies dung or manure, *huanacaci* signifies the application of manure to land, and *huanaes* signifies birds which supply dung of a kind and in quantities fitted to be used as manure; and the first of these words, though pronounced *whana* by the Peruvians, has been corrupted by the guttural enunciation of Europeans into the word guano.

Peruvian guano is the chief supply in the market, but all the guano in the world is very limited in quantity compared with the demand; hence many unprincipled parties have resorted to adulterations and imitations. Every farmer, however, can manufacture his own guano, by saving all the manure and refuse of his poultry yard. Mr. Greeley considered that farmer unskillful who could not with $100 expense manufacture more manure and fertilizing material on his farm than with $150 worth of material brought from abroad. On analysis, Peruvian guano yields 14⅔ per cent. of water, 53⅓ per cent. organic substance, and 33⅔ per cent. ash. Of the latter the principal ingredients are lime, nitrogen, potash, and phosphoric acid. Guano and all poultry manure is very concentrated ("strong"), and there is always danger of over-dosing the land with it. What crops need these fertilizers, and in what portions, are indicated in the respective articles.

The deposits of guano longest and best known, and for some time supposed to be the only ones in the world, occur on the islands and sea-board of Peru, between the 13th and 21st degrees of south latitude. They exist in limited and irregular patches and masses, and have sometimes a thickness of 50 or 60 feet, and are excavated, in the course of commerce, like mines of iron ochre. They comprise many varieties, as to both the comparative age of the accumulations, and the degree and manner in which they have been modified by natural chemical action and by alluvial intermixture; but, in general, they are popularly classified into merely three kinds, the white, the dark-grey, and the red. The white continues to be deposited, and may readily be observed in a quite recent state in the localities which are at present frequented by vast flocks of flamingoes, cormorants, cranes, and other sea-fowl; it has been collected on the isles of Islay and Jesus, at the rate of 20 or 25 tons in a single season; and it may be observed in the island of Torricella, and probably in other places to be gradually passing into the red variety.

The great thickness and vast aggregate extent of the



RUFFED GROUSE.

deposit of guano may seem to warrant a doubt as to their origin in the mere excrementation of birds. The Peruvians, under the government of the Incas, knew well the fact of their origin, and highly appreciated their economical value for the national agriculture; and they made the killing of the young birds on the guano islands a capital offense, and appointed an overseer to the charge of each island, and apportioned the several islands, for manuring purposes, to definite, adjacent, and respective districts of the main land throughout an extent of 200 leagues of coast. But when the Spaniards entered the country, they for a time regarded the whole of the Peruvian account of the guano as a fable, and seemed to regard the accumulations of manure as far too vast to have possibly arisen from the excrementation of birds; and modern visitors to Peru, who should look only to the most superficial appearances, will find that the immense flocks of birds which formerly frequented these shores have been disturbed or driven away by the increase of traffic, and may possibly regard the smallness of the existing flocks as a conclusive proof that the guano must have had other origin. Many things, however, afford decisive evidence that the main part of all good guano consists entirely of the excrements of birds, particularly the observation and testimony of the ancient Peruvians, the observed formation of white guano in some places at the present day, the occurrence of the feathers and bones of birds in recent specimens of guano, and the close similarity of the chemical constitution of guano to that of the newly-fallen excrement of most birds, and especially to that of the raptorial sea-fowls.

Guard, in a mowing or reaping machine, one of the fingers of the cutting apparatus for protecting the knives. An "open guard" has an opening above the knives, to prevent clogging.

Guinea Fowl, a domesticated bird of the gallinaceous group. It exists in a wild state only in Africa, and has thence been diffused, as a domesticated bird, through Europe and America. In its wild state it associates in flocks of 200 or 300, and delights in marshy situations; and both in its wild and its domestic states it roosts on trees or other lofty objects. It is smaller than the turkey, but larger than a large dung-hill cock; it can not be tamed out of a shy, restless and half-wild habit; and it possesses much courage and does not hesitate to attack a turkey. It has a peculiar gait, a singular chuckle, and a harsh, screaming cry; and the male and female of it are so exceedingly like each other as not to be easily distinguished. It has such habits of feeding and domestication as to sufficiently fit it to be kept in the same poultry ground as common fowls; but it makes its nest in very secluded and secret spots, far from home, and gives no notice of laying or sitting; so that its eggs can not be easily found, and require for the purpose of domestic propagation to be hatched and fostered beneath a common hen. It serves as a good night-watch to a farm residence or poultry-yard, for whenever it is disturbed during the night by the sound of footsteps, it makes such loud cries as to summon the attention of the inmates. It is very prolific; both its eggs and its flesh are generally relished. It has been supposed to combine the properties of the pheasant and the turkey. Its flesh, both in color and in flavor, is more like that of the pheasant than that of the common cock and hen. It possesses much delicacy, and is in fine season in March and April.

To commence breeding them, it is best to set their eggs under a common hen, as the old birds wander so far from the premises. If regularly fed, however, at the place of their birth, they will remain about home. They roost on the lower branches of trees, and cannot be persuaded to stay in a house. Eggs must be taken from a Guinea fowl's nest without her knowledge, else she will forsake it altogether. Some nest-eggs, therefore, must be left every time. For breeding, the earliest eggs should be given to a common hen, as the Guinea hen herself is generally too late in the season contracting the "sitting-fever" of her own accord. The chicks require food almost immediately, at least within six hours after hatching, and should be cared for in the same manner as young turkeys, though they may be allowed more liberty. They require more constant feeding than any other chickens, a few hours' abstinence being fatal to them. They need also more animal food, especially in winter. Corn meal should never be fed to the young Guineas during their "baby-hood," but the food should be the same as that given to young turkeys, such as stale bread soaked in fresh milk, cottage cheese (made from thick milk after the whey has been strained off), bits of hard-boiled egg, chopped onion tops, etc., not forgetting that, when feathering up, they require the food little and often, as much as they will eat at a feed, and no more.

Guinea Pig, a small and beautiful Brazilian quadruped of the order Rodentia. It occurs wild in the woods of Brazil and Paraguay, and is treated and used in Great Britain in the same manner as the tame rabbit; and is often kept upon premises in the belief that its odor drives away rats. It is about seven inches long, and has a white ground color, variegated with irregular-outlined spots of black and orange. It is enormously prolific, and but for being unable to withstand the effects of cold and moisture, it would, in its wild state, speedily outrun all possible supplies of food in even the most luxuriant region. The female has been known to produce young ones when only two months old; her period of gestation is only three weeks; she brings forth a new brood at least every two months, and a single pair are capable, in the course of a twelvemonth, of multiplying into a thousand individuals. The young do not attain maturity of growth till they become about six or seven months old; but they are as active and alert about 12 or 14 hours after birth as when full-grown, so that they require exceedingly little parental care. The Guinea pig is eminently cleanly in its habits, and may often be seen cleaning and smoothing its fur with the most sedulous care. It is particularly fond of parsley and pomaceous fruits, but readily feeds on any one of a great number of herbaceous plants; it appears to ruminate after eating, and it drinks very little, and is exceedingly sensitive to damp and cold. Its flesh is regarded by the Italians as delicate food, and its skin is nearly as valuable as that of the rabbit.

Gull. These birds are well known everywhere, being found almost universally spread over the globe. They are distinguished from other sea-fowl by their straight bill, bending downward toward the point, and marked below the under mandible by a triangular prominence, by their light body, supported by large wings, by slender legs, palmated feet, and a small hind toe. They are timid and cowardly except in defense of their young. Generally seen in large flocks, the old and young separate; the larger species frequent the sea, the smaller, lakes or rivers. They walk with tolerable ease and swim well, but are incapable of diving. They keep much on the wing and their flight is rapid, strong and long sustained, even in heavy gales. In sitting, they contract their neck, and rest on one foot. They are extremely voracious, fighting with each other for prey. They are patient of hunger, but will feed on every kind of animal food either dead or alive, putrid or fresh. Their principal food, however, is fish, for which they will follow the shoals; they catch them with great agility, darting down like an arrow. They breed only once a year, laying from two to four eggs. The species are exceedingly numerous and resemble each other greatly. The gulls are continually fighting each other, the stronger plundering the weaker. No sooner does one rise from the water with a fish in its bill than it is immediately pursued by others stronger than itself, and the first that reaches it tears away the spoil. Should, however, the latter not instantly swallow the booty it has required, it is in turn pursued by others; and, even if it has performed this process, it is ofttimes obliged to disgorge it, when it is seized by one of the pursuers before it can reach the water. The facility which the gulls have of vomiting their food has been taken notice of, even in their captive state. Some of these birds have been tamed, but even then they have always discovered the same quarrelsome and voracious habits. When two are kept together the weaker generally becomes the victim of the ill-temper of the other. This genus is not well understood by naturalists, and much confusion exists as to the species.

Gully, a channel or hollow worn in the earth by a current of water; a gulch.

Gum, a concrete juice, the product of many vegetables. There are many varieties, all reducible to two kinds—soluble, or true gums, which dissolve in water, forming mucilage; and insoluble gums, which soften and swell in water, but are not soluble. Fruit trees often exude gums; this is considered a disease and may arise from the puncture of insects, but according to some, is also an indication of poor soil, requiring putrescent manures.

Gum, Chewing, To Make. Soften 2 ounces balsam of tolu in a water bath, and then mix with it 1 ounce white sugar and 3 ounces bolted oatmeal; roll in finely powdered sugar or flour, and form drops or sticks, to suit the fancy. Another article is made by dissolving paraffin at a gentle heat in a very little olive oil and glycerine; stir it after it becomes cool, and then compress it. The quantity of these ingredients depends somewhat on their quality, and somewhat on what product is desired.

Gums, To Preserve. Keep the tartar off the teeth, rub the gums a minute or two every day with the finger dipped in cold water or brine, and abstain from drug lotions. But the best known drug to harden the gums is a mixture of ½ pint of Jamaica spirits, ½ teaspoonful each of powdered alum and saltpeter and 1 ounce pulverized myrrh. For sponginess, foulness and scurvy of the gums, add 1½ to 2 drachms of Peruvian bark to every ounce of the dry ingredients of any simple tooth paste. A good wash for sore gums consists of 5 drachms powdered borax dissolved in ½ pint of distilled water. For ulcerated gums, take of hypochlorite of lime 10 to 25 grains, gum Arabic mucilage 1½ to 4 drachms, syrup of orange peel 1½ to 2 drachms, and mix thoroughly.

Gunny, a strong, coarse kind of sacking, made from the fibers of certain East Indian plants.

Gunpowder, To Make. Pulverize separately 76 parts nitrate potassa, 11 sulphur and 13 freshly burned charcoal; mix these with a little water, roll into cakes on a board, dry on clean paper in a warm place and crumble it up.

Gunpowder Burns, To Treat. Smear the scorched surface with glycerine, by means of a feather; then apply cotton wadding and cover with oil silk.

Guns and Gunning. In this article we shall treat of guns and ammunitions and their uses, which includes the manner of hunting the various kinds of game. The article is very largely extracted from the Sportsman's Gazetteer, by Charles Hallock, who is considered authority on the subject of guns and their uses.

"In laying down specific instructions for the selection of guns and rifles, with their appropriate charges and various kinds of ammunition adapted to different localities, seasons, and varieties of game," says Mr. Hallock, "we do so with the positive conviction that our views and opinions will be controverted at the outset by hundreds who may differ with us and with each other; just as they would be if we took a position diametrically opposite from that which we now take. With this special plea, we will proceed, simply premising that what we print here has received the sanction of gentlemen of venerable experience in the use of old-time and modern implements in all parts of America, on both sides of the Rocky Mountains, and

THE RETRIEVER AND MALLARD.

who are recognized by the sporting fraternity as reliable and sufficient authority.

THE RIFLE. "All rifles divide themselves in two great classes, long-range and short-range. Long-range rifles are used as military weapons for arming infantry, and as sporting weapons for hunting cariboo, deer, antelope, and other such timid game as will not allow of near approach. Short-range rifles are used as military weapons for arming cavalry, and for general sporting purposes. The division between the two may be taken at two hundred yards. Rifles for match shooting may be used at both ranges; but, from the natural desire of all of us to accomplish the most difficult feats, they are generally held to mean long-range weapons.

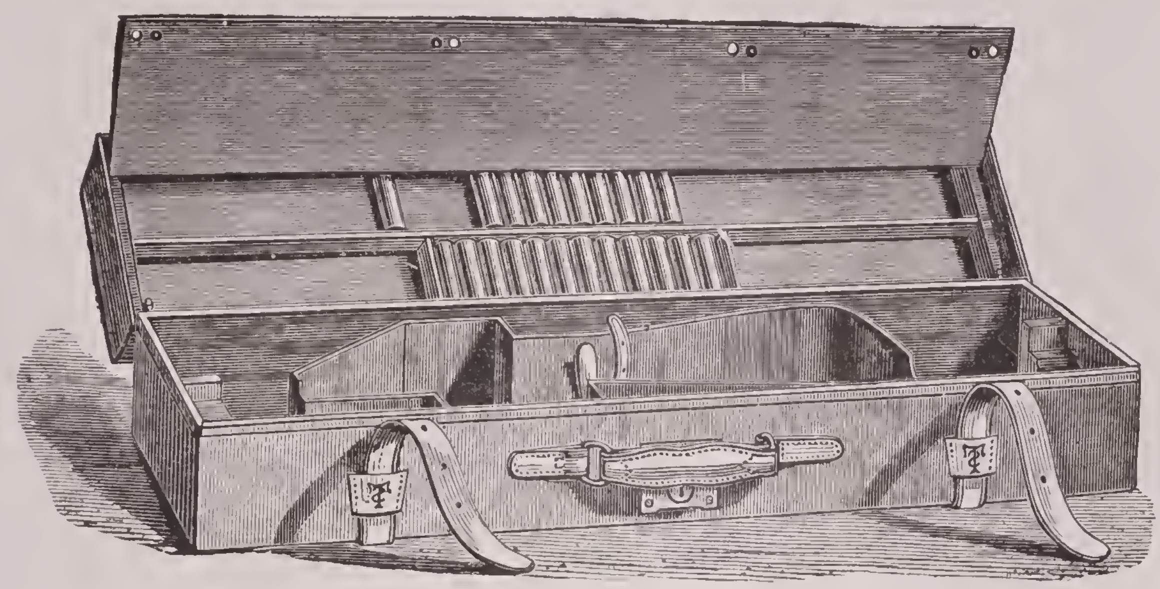


FIG. 1.—*Gun Case.*

"The first rule we shall lay down is this: It is necessary to decide whether you want a rifle for long or for short range. You can select either or both, but not both in the same rifle. One will not do the work of the other. A knowledge of this will save much annoyance and some money. The first requisite of a short-range rifle is that you shall be able to hit any mark small enough to be seen over what are technically called "hunting sights," with an off-hand shot from the shoulder. Greater accuracy than this is not needed. Such a rifle ought to shoot close enough to place a majority of any number of shots within the following-sized targets: 2-inch ring up to 50 yards distance; 4-inch to 100 yards, 6-inch to 150 yards, and 8-inch to 200 yards. A good off-hand shot can do this and fire very quickly, and his gun ought to be able to shoot as close as he can hold it.

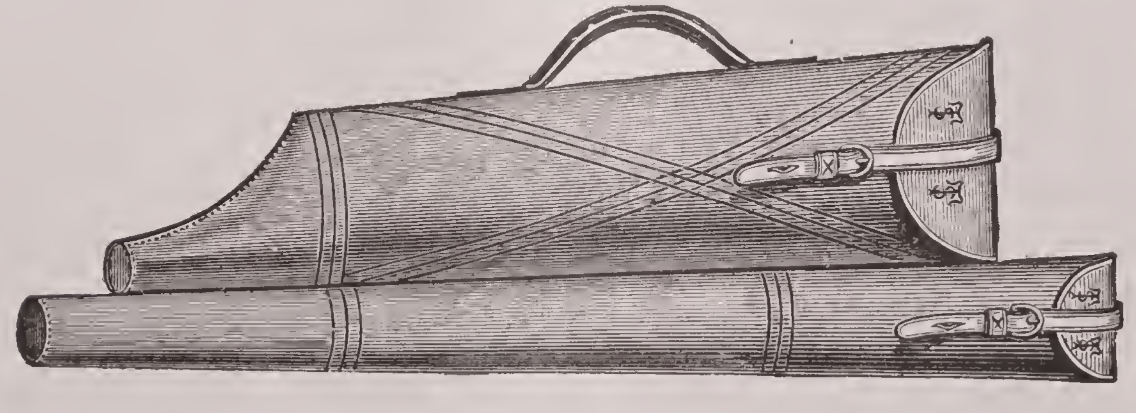


FIG. 3.—*Gun Case.*

"To summarize, the formula for sighting seems to stand thus: Coarse very near the piece, with a less coarse to fine at 20 yards (center, p. b.), thence finer to extra fine at 66 yards thereabouts (and greatest error), thence less fine to fine at 100 yards (center p. b.), thence coarser and coarser (beyond the range). Of course different rifles, and the same rifle with different charges, etc., produce different curves, or errors. Hence, in general, learn well by practice and study the deviations of your rifle along the whole distance, and then (for close shooting) seek so to aim as to correct them.

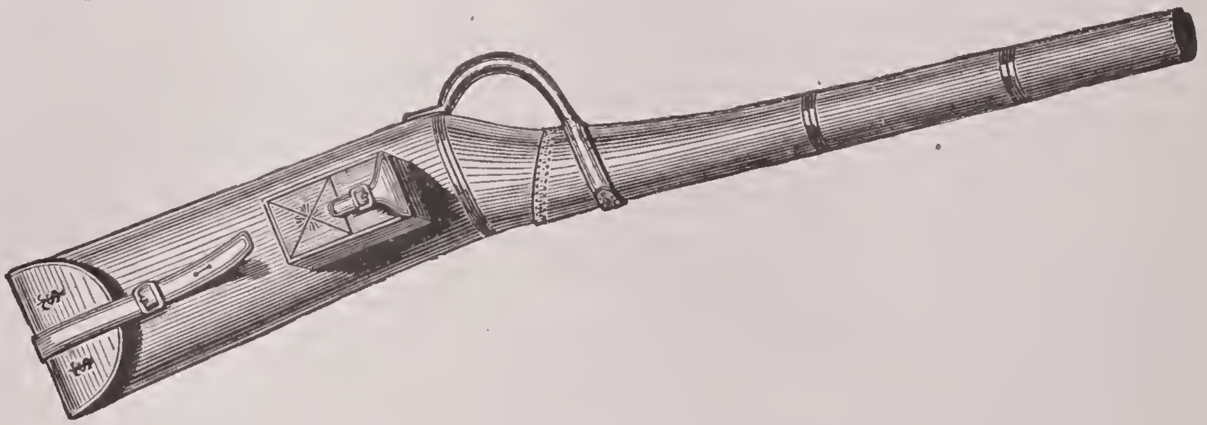


FIG. 2.—*Gun Case.*

"Good shooting, however, cannot be done without good ammunition.

"The pasteboard wad over the powder has its advantages and disadvantages. If the bullets fit the shells loosely, it prevents the powder spilling out in carrying, if the bullet comes out, and it also serves in a measure as a gas check, and prevents, in a degree, fire cut. But if the bullet is concaved much in the base, the wad is liable to be forced into the hollow base of the bullet and go with it.

"Another very important item is the composition of the bullet, which must be of a hardness in proportion to the amount and strength of the powder used. A bullet that would be hard enough to use with 70 grains of powder and shoot well, would be good for nothing to use with a charge of 100 or 110 grains.

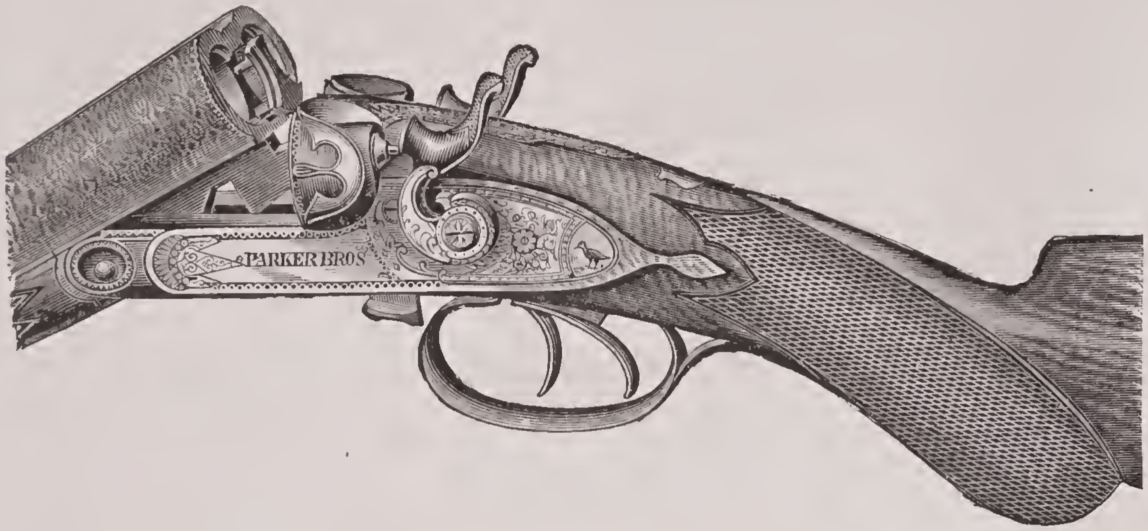


Fig. 4.—*Double-Barreled Shot-Gun.*

"Then the size of the bullet is another point to be attended to. If it is too large it is apt to bind in the grooves of the gun in inserting the cartridge, and tear the patch; and if too small and is loose in the shell, it is liable to slide a little toward the muzzle if the gun is held muzzle downward, and also to be driven forward a little by the blow of the firing-bolt upon the cap before the charge is ignited. All these little things make a difference in the shooting, and help to produce unaccountable misses. The same care and nicety should be observed in loading each and every cartridge as would be required in loading the most elaborate muzzle loader.

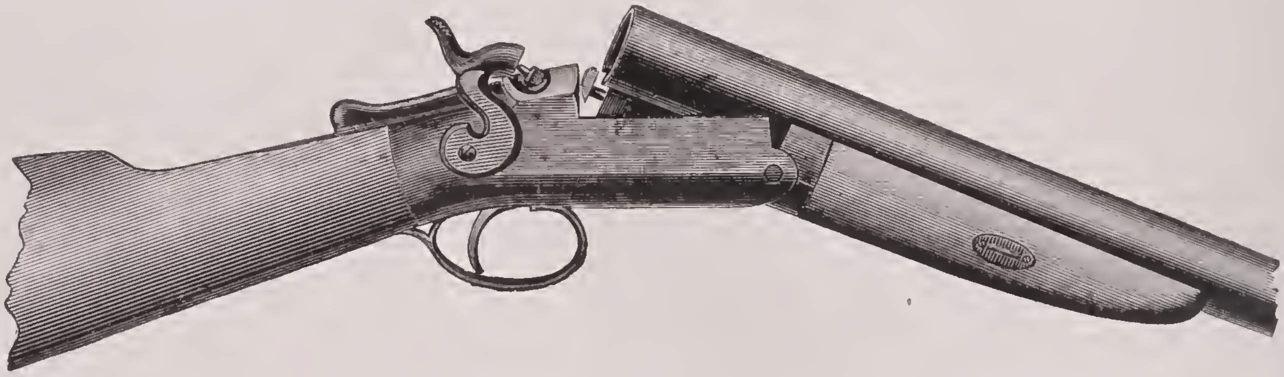


Fig. 5.—*Single Breech-Loader.*

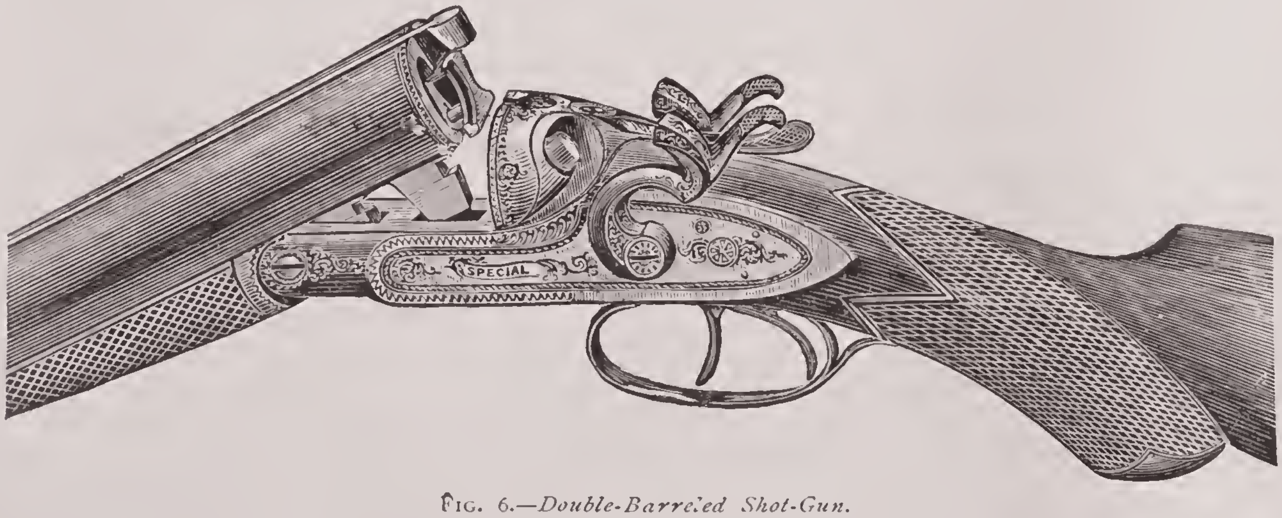


Fig. 6.—*Double-Barreled Shot-Gun.*

"Another important requisite to successful shooting, as may be gathered from what has been already said is that the ball should have sufficient impinging surface to give a severe shock to and stun the game fired at. This requires a large caliber for small game.

"The sportsman will have no difficulty in finding a number of different rifles in market which will answer the requisite of accuracy within the conditions above laid down. To get a rifle that does not require the use of an elevating back sight above 150, or even 100 yards, we shall not find easy. The reason of this is that military rifles, which are long-range, are so fashionable that makers of so-called sporting rifles follow the proportions of powder and projectile, and the rate of twist best suited for long range, but quite unsuitable for short range. For long range we want as small a bore as possible, as long a projectile as possible, and a very quick twist, to give enough velocity of rotation to keep the elongated projectile end foremost, and as much powder as the small bore will burn. The result is a moderate initial velocity; but owing to the small surface exposed to the resistance of the air, the momentum of the heavy projectile, a very long range.

"Now, for a short-range rifle we require the very opposite of all this. We want as large a caliber as possible, so as to make a big hole in our game; as large a charge of powder as possible, to give a high velocity, without which we cannot have a low trajectory. This also requires a short projectile, to diminish the friction on the grooves, and a short projectile requires a slow twist. The length of barrel must be shorter, which also reduces friction. To reduce these proportions to practice, we find that the Creedmoor long-range rifle and its ammunition have the following proportions: Weight of rifle, 10 pounds; weight of projectile, 550 grains (ratio 1-6); weight of powder, 90 grains; twist, 1 in 20 inches; caliber, 44-100; length of ball, 1.6 inches; length of barrel, 30 inches. A short-range rifle, suited for deer, bears, buffalo, etc., should have the following: Weight of rifle, 9 pounds; weight of projectile, 320 grains (ratio ¼); weight of powder, 80; twist, 1 in 48 inches; caliber, 55-100; length of projectile, ¾ inch; length of barrel, 24 inches. For smaller game, such as turkeys, a caliber of 35-100 will answer, and the length or weight of ball, charge of powder, etc., will be reduced in proportion.

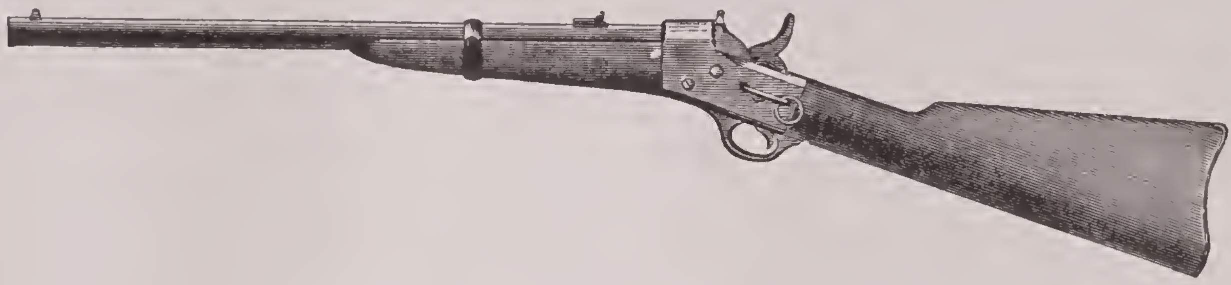


FIG. 7.—*Cavalry Carbine.*

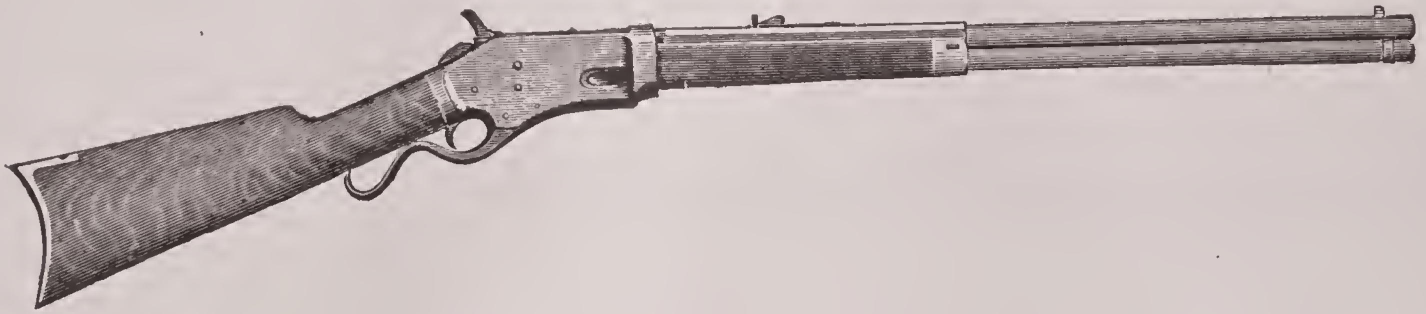


FIG. 8.—*Half-Octagon-Barreled Sporting Rifle.*

"The difference in the practical operation of the two rifles will be this: With the long-range weapon, if you have your range within a very few yards, and elevate your back sight accordingly, you can make accurate shooting at all ranges. But if you misjudge your distance at all, or even if you know it and have not time to elevate your back sight to its proper height, you will certainly either shoot under or over your game. With a short-range rifle proportioned as we have described, the drop of the ball, owing to its great velocity, is so little, there is absolutely no judging of distance required. Whether you are at 25, 50, 75, or 100 yards, all you have to do is to draw a little coarser bead the farther off your game is. Practice will soon show you how much. Your ball should not deviate more than a couple of inches above or below, and this does not exceed the limit of accuracy heretofore laid down.

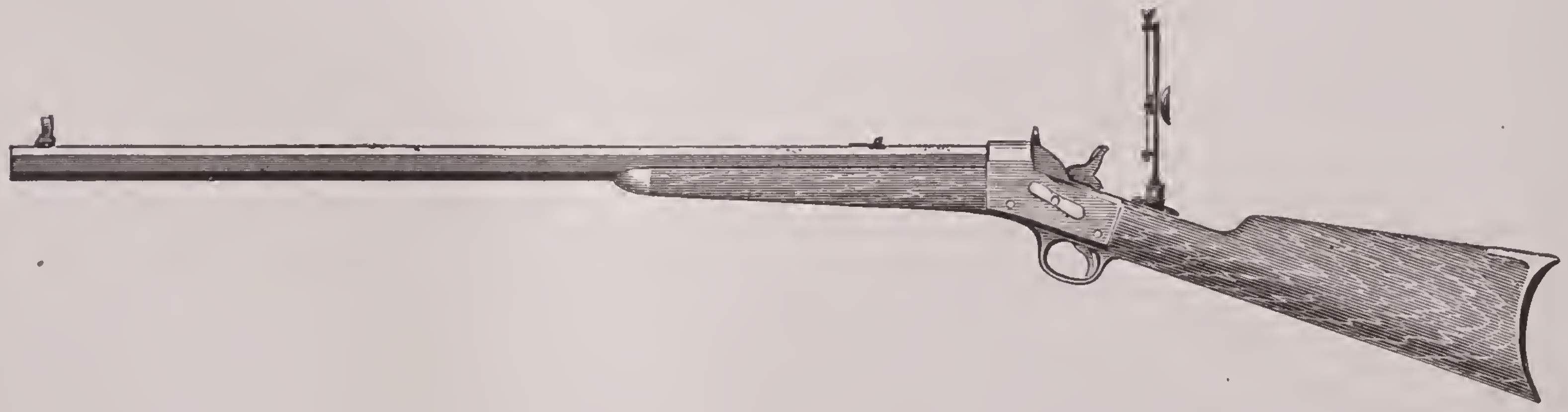


FIG. 9.—*Creedmoor Target Rifle.*

"The faults of modern American breech-loading rifles intended for sporting use are: 1. Not large or heavy enough projectile to make a disabling wound on an animal as large as an old buck deer. 2. Not enough velocity of ball, owing to too little powder being used, and too great friction, resulting from an unnecessarily quick twist. The muzzle-loading hunting rifles that were made 20 or 30 years since avoided the second of these faults. Their caliber was smaller than we should now use; but the reason was that in those days a hunter had to prepare his own ammunition, and he liked to make it go as far as possible. There is one other point that deserves mention. Shall we choose a single-loading rifle, or a repeater, that carries a magazine of cartridges? Now, it is very clear that there are many advantages in a repeater, and the only question is whether there are any disadvantages, due to its peculiarities, sufficient to counterbalance the admitted advantages.

"The best known of this class of guns is the 'Winchester,' which is made of three models, viz., that of 1866, 1873, and 1876, using respectively charges as follows: 1866, Rim Fire 44 cal., 200 grains of lead, 28 grains of powder; 1873, Central Fire 44 cal., 200 grains of lead, 40 grains of powder; 1876, Central Fire, 45 cal., 350 grains of lead, 75 grains of powder; thus giving a range of power to suit the peculiarity of the game in any section of the country, the 1876 being adapted to the heaviest game our country affords. The mechanical arrangements of all the models are the same, and is proven by experience to be strong and durable, the model of 1876 having been tested with 203 grains of powder and 2,100 grains of lead without injury. There is no more complication to this gun than in most of the single breech-loaders, and consequently no more risk of its getting out of order."

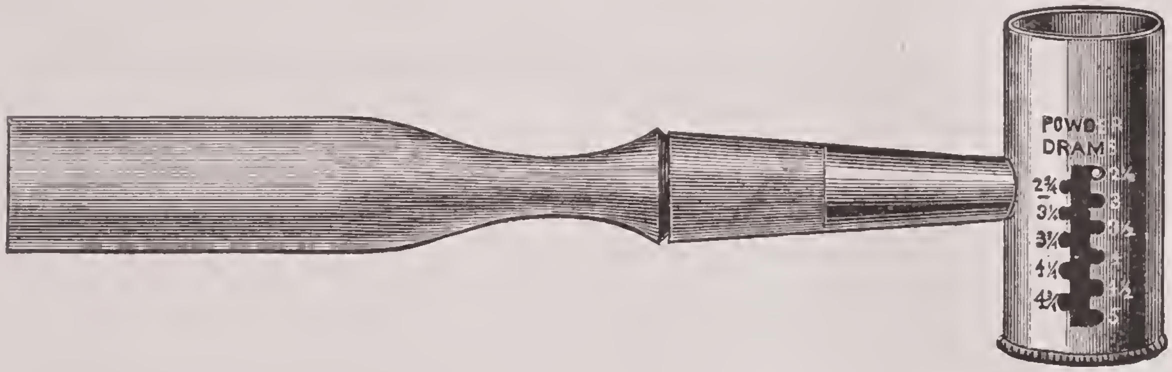


FIG. 10.—*Powder and Shot Charger.*

GUNS TO CARRY BALLS. In the timber, where the game is shot at short distances, a strong double gun is a formidable arm when loaded one with ball and one buck-shot cartridge. The ball may be relied upon for ten rods, and at a still longer range with slight elevation, and for snap shots at running game, will do fatal work about as often as a rifle. The round ball is considered as more immediately destructive than any other. The blow is very powerful and the "shock" to the animal consequently great, while the flesh and skin will hardly close over the wound to retard bleeding. It is claimed that large game will succumb more rapidly to the ragged crush of such a large ball, and save many a mile of trailing or the loss of game. There are many long, arduous tramps taken after large game, when every ounce is to be well considered in arranging packs; and when but one gun can be carried, the use of ball in double guns may enable a hunter to decide upon taking a gun that will bring ducks, spruce grouse, etc., to the larder. Round-ball cartridges may be prepared in the same way as shot cartridges, with a wad over the powder, but none on the ball, simply creasing the shell deeply over it, to keep it firm.

SHOT-GUNS. While the muzzle-loading rifle may be said to still hold its own with the breech-loader, as proved by the long-range tests at Creedmoor and elsewhere, as well as in the field, the muzzle-loading shot-gun has had to defer to the breech-loader. The advantages are so much with the latter, especially in wing shooting, that we shall confine our few remarks to it exclusively. There are so many makers of excellent guns, both English and American (which are chiefly in use in this country), that in attempting a selection of the best, comparisons as to their merits become invidious and fruitless of satisfactory conclusions.

In the purchase of guns sportsmen should be governed by their pecuniary resources; and as all cannot afford to purchase the highest-priced English guns, which cost at least $250 in our markets, including their fixtures, they naturally inquire if an American gun equally good cannot be bought at a price much less. Undoubtedly we have as competent gunsmiths here as any abroad; and inasmuch as most of the materials used by them are of foreign production, imported in a crude state, it is reasonable to suppose that they can be and are perfected and embodied in the completed gun at a much less expense than the imported gun would cost. Such a gun, when obtained, is a treasure. But it happens that a great many inferior low-priced guns are placed upon the market under the pretentious titles of "stub-twist," "laminated steel," "Damascus," and the like, retailing at from $30 to $70; so that one is liable to be deceived unless he is a good judge. The only safety in purchasing, therefore, is to obtain reliable counsel, and to deal with honest and responsible parties.

Inasmuch as good muzzle-loaders can be bought at very low prices, there is a prevalent disposition to have them altered to breech-loaders, for the sake of convenience and safety; but we would not advise this change except in special cases, as the expense of altering will nearly equal the additional cost of a new breech-loader. Choice of guns depends upon the habits and quests of the shooter. For a man who shoots but little, and seldom on the wing, a muzzle-loader is as good as need be required. For a man who wants a general service gun, for field, cover and trap shooting, a breech-loading gun of eight and a half pounds weight, 30-inch barrels and 10 gauge, is the proper tool. It will answer for snipe, grouse, hares, turkeys and ducks, and for deer when loaded with buck-shot. However, a No. 12 gauge is serviceable enough, the odds against it being merely that it will not stand so heavy a charge as a 10 gauge, and of course will not bag the game shot at as often or as easily as the other. For wild-fowl shooting use a gun from nine and a half to ten pounds weight, 32-inch barrels, and 10 gauge. For "point shooting," on the Chespeake Bay and similar places, a 14-pound, five to eight bore single gun is the most effective.

Guns for natural-history specimens should be 16 bore and 26-inch barrel; load with mustard shot and a half drachm of powder. No gun will do itself justice or give proper execution unless it is properly loaded. Correct loading used to be acquired by careful observation and practice; but now we have a table of proportionate charges for different gauges, which has been prepared by Major H. W. Merrill, United States Army, to whom all inexperienced sportsmen owe a large debt of obligation. The table, which is herewith given, is based upon the rule that "*The proportionate charges of shot-guns of different bores are to each other in the ratio of the area of their bores.*"

TABLE OF PROPORTIONATE CHARGES OF SHOT-GUNS OF DIFFERENT GAUGES FROM NO. 4 TO 16 INCLUSIVE.

	Gauge Numbers.	Diameters of bores.	Areas of bores.	Ratios of areas.	Loads powder in drachms.	Loads of shot in ounces.	No. of pellets exactly.	
	4	1.08	9137	2.45	7 1-3	2 7-16	534	
	5	.99	7693	2.06	6 1-5	2 1-16	449	
	6	.93	6782	1.82	5½	1⅞	397	
	7	.89	6277	1.67	5	1 13-16	364	
	8	.85	5052	1.51	4½	1½	329	
	9	.82	5275	1.41	4¼	1 7-16	307	
	10	.79	4398	1.31	4	1 5-16	286	
	11	.76	4521	1.21	3 2-3	1 3-16	264	
	12	.73	4176	1.12	3 1-3	1⅓	244	
	13	.71	3956	1.06	3 1-5	1 1-16	231	
Unit of measure, 24½ dr'ms.	14	.69	3736	1.	3	1	218	Tatham's standard shot No. 6.
	15	.67	3516	.94	2 4-5	.15-16	205	
	16	.65	3228	.86	2 3-5	.14-16	188	

NOTE.—The unit of measure is three drachms of powder and one ounce of shot for a No. 14 gun.

The charges given are not too light for small game within 45 or 50 yards; for young boys they are too heavy, and may be reduced one-fourth. The Major advises that beyond 50 yards, for large game, ducks, turkeys, geese, deer, etc., the charges be increased according to the powers of the gun and the ends to be accomplished. Some persons will say, and quite truly, that all guns of the same bore do not call for the same amount of ammunition. They are exceptions to the general rule; load them to suit their peculiarities. Very light guns, with large bores, may not shoot pleasantly, from too much recoil; load them less, but at the expense of penetration and wounded game. Cheap guns with rough barrels, and rusty or dirty guns, may kick too much with these loads. These, with all other nondescript and unduly proportioned guns, are excepted from the general rule. This presupposes fair guns only. Very diverse results with good guns may be brought about by having the powder disproportionate to the shot and conversely; using very coarse or very fine powder, also very coarse and very fine shot; by employing more or less wads varying in diameter and thickness, and setting them home on the charge with different pressure or ramming; by holding the gun, when discharged, firmly to the shoulder, or otherwise, etc. Now, if all these items control the shooting, does it not follow that to load a gun accurately for all purposes requires many experiments, good judgment, and even great skill?

Choke-Boring. There have been many crucial tests of choke-bored guns against smooth-bores, both in this country and England, but the advocates of one and the other do not seem wholly satisfied with the exhibit as deciding their respective merits. The advantages of choke-boring under certain conditions of field shooting are certainly conceded. The effect of choke-boring is to increase the effectiveness of the gun at long range. If we did all of our shooting at very long range, we would be induced to use a choke-bored gun, or at all events, to have the barrel choke-bored; but for our own customary service we prefer a gun not choked, for the reason that we have found that the Kay concentrating cartridges produce the effect that is claimed for the choke-bores. Thus we have the choice, at all times, between the straight and the choke, which gives us an advantage in shooting which we should not have if restricted to one or the other.

In the following illustrations we very accurately show some of the best guns now in our market, together with many of the parts:

Figs. 7, 8 and 9 represent rifles made by the Whitney Arms Co., Whitneyville, New Haven, Conn.

Fig. 7 is a sporting rifle. It is simple of construction, strong, made of the best material, easily manipulated and safe. The firing pin can not reach the head of the cartridge until the breech is fully closed; therefore the piece can only be fired when the breech is locked. The shells can be re-loaded. Fig. 8, a target rifle, withdraws the firing pin by positive motion. It withdraws the cartridge shell clear from the chamber. It loads on the half-lock. The breech block is securely locked the instant it is closed. It is fired by a center lock. It has an extra notch on the hammer and can be carried loaded without fear of accidental discharge.

A Creedmoor target rifle is made which is smaller and of less weight, and is calculated for the young amateur.

Fig. 9, the cavalry carbine, is one of the best manufactured. Its component parts are all of the best material and it never misses fire.

In Fig. 4 we illustrate the "Parker" Breech-Loading Double-Barreled Shot-gun.

The construction of this gun is so simple any person with nothing but a screw-driver can take it apart for cleaning or repairs. The springs used, aside from the locks, are such as can be made by any one.

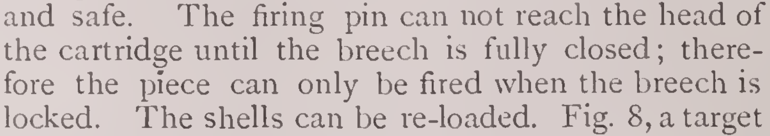


FIG. 11.—*Loading Plug.*

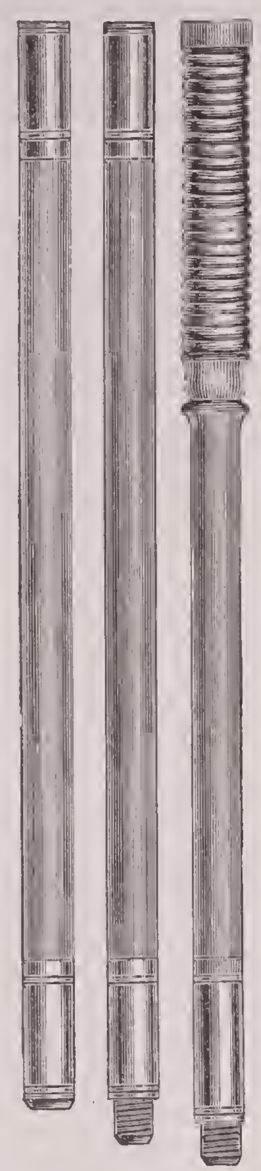


FIG. 12.—*Cleaning Rod.*

Fig. 11 represents a loading plug which can be used either for loading shells or extracting caps.

The cleaning rods shown by Fig. 12 are made from the finest imported wood; the joints brass or nickel-plated and have patent implements accompanying them. In Figs. 13 and 14 we give illustrations of the adjustable cleaning rod.

They represent the cleaner open and closed. The self-adjusting action of the spring brings the cleaning implement to bear upon every portion of the inner surface of the gun, thus cleaning a gun choked on any principle. In loading accurately the powder and shot measure (see Fig. 10) and capper (see Fig. 15) are necessary.

The capper, hand shell-extractor and a screw-driver may be all combined in one. There is also a good combination screw-driver (Fig. 16), which will be found convenient and serviceable.

The cartridge belt, Fig. 17, revolves around the body. Gives perfect ventilation to the chest, carries any size of shell and holds them open end up, thereby preventing the wads starting in loaded shells.

All guns, of any value, should have a case. The protection thus afforded will keep a gun in better condition and for a longer time than one could hope to without a case. We present several different kinds. Fig 1 represents the shell-top gun case. It is first quality, extra heavy sole leather and steel frame, with compartments in cover holding 75 shells, sliding stock tray so as to fit any style and loading tools. Barrels placed in tray over stock. Figs. 2 and 3 are simply gun cases. They are made of heavy bridle leather with pockets for cleaning rods. The foregoing accompaniments to a gun are all made by Parker Bros., Meriden, Conn., a good, reliable firm.

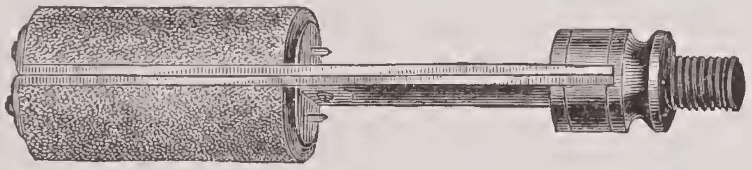


FIG. 13.—*Adjustable Cleaning Rod, Closed.*

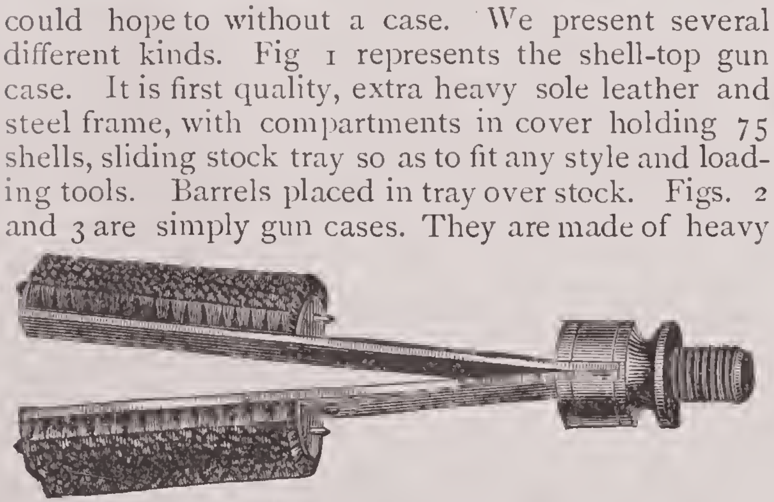


FIG. 14.—*Adjustable Cleaning Rod, Open.*

The single breech-loading gun, Fig. 5, Will H. Cruttenden, General Agent, Cazenovia, New York, has a top lever for opening the gun, which serves as an indicator showing when the gun is securely locked. The lug extends through the break-off and is very wide. The actions are all well fitted so that the gun is not liable to shoot loose.

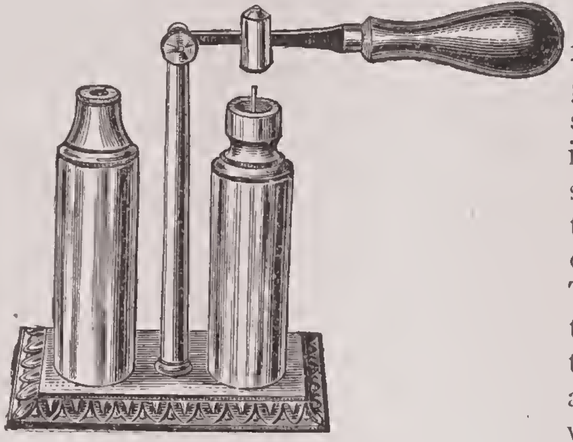


FIG. 15.—*Capper.*

GUNNING: HOW TO SHOOT. In firing, press the gun firmly against the right shoulder, place the index finger of the right hand on the trigger, with the thumb over the grip just behind the hammer. Support the other end of the gun by letting it rest on the left hand at a point about one-third the length of the barrel. The novice should practice bringing the gun up with breech and sight on the same level. The gun should be raised with a firm, quick motion to the center of the object to be shot at, and the trigger pulled the instant the sight is taken; the first sight is always best, and the best shots those that shoot quickest. The beginner should practice on a mark with shot, and should learn to aim with both eyes open. Target shooting with a rifle at rest requires the shutting of one eye. A rabbit in motion affords a splendid opportunity for a novice to test his marksmanship, and when he can kill one with ease he may feel assured of his ability to hit almost anything. But never shoot a rabbit while it is sitting. It is too much like murder, and even a novice should be above that. To be a "crack shot" with a rifle one must have a steady nerve, and all flinching or perturbation common to beginners must be overcome. It will disappear by practice. A good means of testing one's steadiness, is by balancing a half dollar on the end of the barrel of an unloaded rifle, and, after aiming and drawing

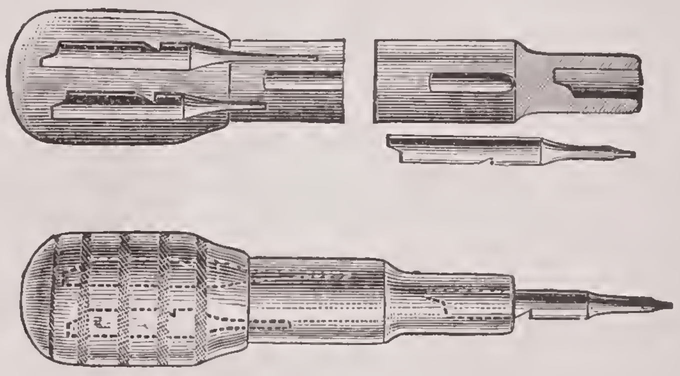


FIG. 16.—*Combination Screw-Driver.*

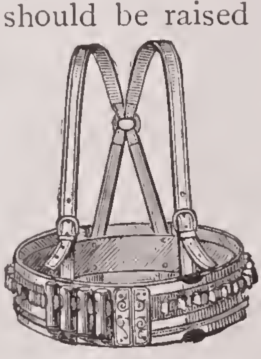


FIG. 17.—*Cartridge Belt.*

SNIPE SHOOTING.

the trigger, if the coin remains the nerves are sufficiently steady. For long-range shooting it is best to kneel, resting the left arm on the left knee.

Loading and Carrying. The handling of breech-loading guns, and the using of shells, is too well known to require direction. In muzzle-loading no wadding is used. The bullet is put on a small round piece of flannel, felt, or thin skin, called a patch, with just enough grease spread over it to make the bullet go down easily. Ram only hard enough to bring the ball down to the powder. If the cap will not go down on the end of the nipple, it can be forced home by gently letting the hammer down and pressing on it. In doing this rest the but of the gun against the thigh, and keep the barrel always pointing at right angles to the body. At no time tap the hammer when it is on the cap, for it may be too violent and end fatally. Never bring the hammer from a full to a half-cock, but first let the hammer clear down, and then re-adjust it. All fire-arms, when not in use, should be oiled well and kept in a dry place. Clean thoroughly, inside and out, before and after using.

To be a successful sportsman one must always keep his gun in readiness, and to do this it should be carried in the hollow of the left arm, with the muzzle pointing back, or with the stock under the right arm and muzzle toward the ground, which is safest, especially when hunting with a companion. Too much caution cannot be used in handling a gun, and it should never be carried in any other than the three ways—the two just mentioned and over the shoulder. If one becomes accustomed to these ways he will think of no other.

While passing through thick bushes *always* carry the gun under the arm, as this prevents its accidental discharge by the trigger or hammer catching.

There is more to be dreaded from a companion's weapon than your own; do not allow him to hold his gun so that you can see down the barrels.

When going through or over a fence, put your gun at half or full cock, for if it should catch in anything, it will not explode as it would if the hammer rested on the cap and was slightly raised and loosed. Keep it well in front, muzzle upwards, with the hand in front of the trigger guard. If you should be in company the one following should bring his gun through the fence pointing backwards.

When expecting game, the gun should be carried on the left arm if your companion is on the right side; or in the left hand, with the muzzle sufficiently upwards to be safe.

The finger should never touch the trigger until the game is moved; for if a stumble or fall occur in walking, and the finger is inside the guard, it is almost certain to cause an explosion.

The hammers should never be resting upon the cap or striker; it is very dangerous, as a very slight blow or concussion from a fall would cause a discharge.

If snow or mud gets into the barrels be careful to clear it well out before shooting, Many good barrels are either burst or bulged from some substance, even a wad, being left in the muzzle. When getting into or out of a wagon, do not pull your gun after you. Keep it in front with the point well up. A breech-loading gun need scarcely ever be loaded except when expecting game; but a few shells should be kept in the most convenient place in case of hurry. Never take a loaded gun into a house, but either draw the shells or take off the caps. Under no circumstances whatever attempt to de-cap or re-cap a loaded shell, but carefully draw the charge first. If a metal shell, keep it well in front, so that the charge would be clear of you in case of explosion; and if a paper shell, better lose the shell by cutting it through to save the ammunition, than run the risk of taking off the primer. In loading shells keep them well away in front, and be careful that the primer does not rest upon any hard substance, but have holes drilled out in the center of the stand. Have metal shells properly fitted for the chamber of your gun, and do not lend them, for if used in a gun of slightly larger caliber than your own, they will burst or bulge, and be useless for your own afterwards. When loading a gun place the butt upon the foot and incline the muzzle well outwards quite clear of your head. If one barrel is fully loaded it should be turned farthest away, keeping the hand clear of it, and only the smallest portion of the finger that is necessary should be over the loaded barrel in using the ramrod. Both barrels should be at half-cock, as the escape of the gas allows the powder to be driven well into the tube. Take care not to leave tow or rag in the breech when wiping out the gun; it may be fired by the first discharge; and igniting the powder in reloading may cause a fatal accident by exploding the contents of the powder flask. Have the caps properly fitted to the tube, so as not to burst in putting on; they will be easily taken off, and not liable to be lost. A spare tube and wrench, a shell extractor, knife, screw-driver, piece of cord or string, and some small money may be found useful to a hunter. Never put away a gun without wiping and oiling outside, and examine the locks often for fear of water and rust. Wash the barrels of a muzzle-loader very often, for in damp weather a large portion of the powder will be wetted, and become caked when forced down into the breech. Be careful that your shells are properly loaded, and carry at least two sizes of shot for ordinary use. A few with buck and B B shot should be kept very conveniently for large game, or long shots at flocks of geese or ducks. Great caution should be taken if the wad over the shot should become loose, to remove it before putting in another cartridge; for if the weight of shot should force the wad to the muzzle of the gun, it would be almost certain to burst or bulge the barrel at the next discharge. Many fine guns are spoiled by this simple thing, and either the maker of the gun or the powder (particularly if Dittmar or any other new explosive should be used), gets blamed for a casualty over which they have no control, and the real cause is never known. It is not very likely that the strength of any powder (even if 20 drams were used) would be powerful enough to damage a barrel which has been tested to stand many times that power before leaving the factory. In resting a gun upon the ground never place the hand over the muzzle; it is very dangerous.

In shooting birds for mounting purposes, load as lightly as possible. Put in no more shot than is needed to kill the bird, and not enough powder to send the shot clear through, making two holes instead of one. "Dust shot" is best for small birds, but No. 12 will answer. For ducks and large birds, No. 8 is about the right size.

To Shoot Game near the ground and moving from you, aim well over the head, or the charge will fall too low. For birds above the gun and flying from you, aim low, or the shot will pass too high. In cross-shooting at close range aim a foot or so in advance. Allow more distance for longer range. Cross shots are alway best, especially for quails, as an easier mark is presented, and a more vital part exposed. A cross-shot may generally be had by walking around, and coming up toward or in front of your dog while pointing. Game should always be approached from the direction in which the wind is blowing, and with birds in a body, aim at those that are farthest away. Do not take your eyes off a flock of birds after firing till they have flown several hundred yards, as some of the birds, though mortally wounded, may not fall at once.

In order to become a good judge of distance, measure out, say 30, 40, 50 and 60 yards at your own homestead, and familiarize yourself with the respective distances.

The pull of the trigger, the quickness of the powder, of which the small grain is said to be the best for snap shots (although perhaps not quite so strong), have all to be considered, bearing in mind that three-fourths, if not more, of the shots missed, are from being behind rather than in front.

This remember and treasure up as the greatest secret in shooting: Never allow your gun to be brought upon a bird from above, or before it; but always from behind if cross shots, or below if rising shots. The course of flight being in direct opposition to the motion of the gun, unless that instruction is followed, it would require at least double allowance to be made, and even then we very much question, unless in very experienced hands, whether one shot in twenty would be effective.

The greatest care should also be used that the gun be held level, so that the line from the eye in taking sight should be along the center of the rib, from the screw at breech to the sight on muzzle.

With ground game the same principle applies more or less, remembering that whereas with birds above your level going right away, you shoot under them; hares or rabbits, and even birds, near the ground being below your level, it is requisite to be well over them, carefully calculating whether it is rising or falling ground, and with side shots be well in front, as explained before.

If a hare or rabbit is crossing you in brush or timber, and you only just get a sight, snap shoot three or four feet in front of where you saw it, and you will be almost sure to find that you have killed. So with a woodcock; shoot after him in the direction he was taking, although you have lost sight, for, being a very soft bird, a single pellet may kill him at 50 or 60 yards. It will be found to answer very often.

HINTS ON PRAIRIE SHOOTING. "The 15th of August," says Mr. Hallock, "is the opening day of the season for pinnated grouse, or 'chickens,' as they are usually called out West, and during the remainder of that month and the first two weeks of September much larger bags can be made than later in the season."

But by deferring the time until the latter part of September, we can have, say, a week's shooting for grouse, and at the end of that time the snipe and ducks will begin to visit the lakes and marshes which abound in the West and Northwest, and afford most excellent sport. In order to have the best sport, it is important that each shooter should take with him at least one good, steady, well-broken dog, and in condition to work day after day, and by all means one that is a good retriever.

Early in the season, use No. 8 shot; later, No. 6.

HOW TO LOAD FOR GAME. A ten-bore will chamber about five buck-shot; put in about four layers and four drachms of powder. Pinnated grouse, three and a half drachms of powder and one and one-eighth ounces No. 8 shot. Ruffed grouse (partridge), three and a half drachms powder and one and one-fourth ounces No. 8 shot. Woodcock and snipe, three drachms powder and one and one-eighth ounces No. 10 shot. Powder, No. 6 Laflin & Rand's. Some years ago fine-grain powder was generally used; the coarse grain gives better penetration and less recoil. Either the brown or blue shells can be loaded again, provided they are intact and not injured anywhere.

BLINDS, DECOYS, CALLS, AND OTHER DEVICES. *The Sink-box or Battery.* The sink-box is about six feet three inches long, one foot two inches deep, two feet wide at the top, one foot eight inches at the bottom. To this box is fastened a platform about 12 feet long and seven feet wide, and to this platform is fastened a frame covered with muslin, as follows: Width at head, nine inches; width at sides, two feet. This box is carried to the shooting grounds by placing it on a boat, and is then anchored at the head and foot, head toward the wind. The shooter then places his decoys at both sides, and strings them towards the foot, so the decoys will form a V-shape; but place most of your decoys on the left, so that the ducks will come on your left, as this is the easiest shooting. After this is done the shooter gets into the box, and places weights in it, so that it will be sunk even to the water. The shooter then lies down in the box with his face to the leeward, so that he can see every dart made, and thus have an easy shot. Where ducks are plenty this is a most destructive contrivance, as the ducks can see nothing until they get over the decoys, and then it is too late, for at this moment the shooter rises up and pours in his deadly fire.

Blinds. A blind is a concealment. Blinds are

WILD TURKEY SHOOTING.

contrived in a dozen different ways to suit varying exigencies. Properly they are imitations of nature, or such close resemblances to natural objects that the birds to be decoyed are wholly unsuspicious of them. If a man is hunting along the margin of a river which is lined with rushes, he bends the rushes over the boat and hides beneath them, taking care that his garments shall be the same color as surrounding objects. If he is among willows on shore or by the river side he partly lops off the branches and lets them hang over him. If he is by the sea-shore, where the waves pile up the kelp and algæ, he makes a suitable pile of his own and uses it for a blind. If logs and drift-wood line the banks of the shore or margin of a stream, a canoe or boat turned over looks like a log and affords a blind. If birds are to be hunted in fields or near cover, a shock of corn or pile of brush answers the best purpose. If in mid-winter, when snow is on the ground, or ice moving in the rivers, blocks of ice set up, or bleached cotton cloth made fast to stakes driven into the ground, make an effectual concealment, and can scarcely be distinguished from the adjacent landscape. The shooter's dress should then be as nearly white as possible. Blinds should never be built higher than the shoulders of the person erect, and the interstices should always be so covered as to conceal his form and movements.

Decoys. Select a clear stick of timber of cedar or pine (cedar is the best), about five by seven inches. Cut it in pieces twelve inches long; make a pattern of pasteboard about the shape of a duck, viewing it from above. Mark out the pieces of wood by the pattern, and rough them out with a hatchet. Make another pattern of the side view of the duck's head and neck when shortened or drawn in, and mark out some heads on a piece of inch and a half board, so the grain of the wood will come lengthwise of the duck's bill. Saw them out with a key-hole saw. Cut a square place in the body of the decoy about three-quarters of an inch deep to receive the base of the neck. Fit a neck to each body, and bore a hole lengthwise through the head and neck into the body; make the joint of the neck with glue, and fasten the heads on the decoys by driving a pointed, tight-fitting piece of wire through the hole already made. When the heads have been fastened, shave them in form with a draw-knife, rasp them off smooth, put the finishing touch on the heads and crook of the necks with a jack-knife, and sandpaper them thoroughly. Buy some white lead, boiled oil, and dry colors, and paint them as near as possible like the ducks that are to be hunted. They may be made to look more natural by putting glass eyes in the head, set in holes in plaster. When used, anchor them from a staple driven in the fore part of the body, so the ducks will always head to windward, as live ones are in the habit of doing.

Dead Ducks as Decoys. Having killed the duck and secured him, take a stick, a reed or the stalk of a strong weed that is stout and strong, sharpen one end to a point, which insert under the skin of the duck's breast and along up the neck just beneath the skin, into the head. Do this so that the head will hold a natural position to the body, and the neck is not awry. Then wade out and plant the other end of the stick in the mud over which there is a foot of water or a little more. The body of the duck must then rest on the water as that of a live duck does, and after having smoothed the feathers nicely. It is best to keep on setting these decoys until you have seven or eight, and if you increase the number it will be all the better.

Stools for Snipe, etc. Stools are made of wood in imitation of the birds to be decoyed; or dead birds may be used as above. They should be placed at a proper shooting distance from the blind where the shooter is concealed.

Live-Geese Decoys. In bar shooting they should not be staked out for the following reasons: Very few Canada geese or brant used for decoys become properly reconciled to their captivity. They remain more or less wild, and when fettered, are apt to lose their footing, on account of sudden frights, etc., and fall forwards all in a sprawl. There they remain prone, tagging and straining for hours until relieved. If wild geese are in the vicinity where this occurs, good-bye to the game; it will not be deceived. Moreover, the gunner should retain control of his decoys, in order to be able to get them away, when necessary, from the spot towards which the wild birds are heading.

Turkey Calls. Make a little box of Spanish cedar two and one-half inches long, three-fourths to seven-eighths deep, and one inch wide. Cut a piece of smooth slate so that it will lie nicely in the bottom of the box; have the top smooth and even and no rosin will be needed. Make the box of the same material throughout, and put together with brass pins. Brads or glue spoil the sound, not giving sufficient vibration. If made from pieces of cigar box, be sure that no paper remains on the box, and use the thinnest portions. Another call consists of a short piece of Spanish cedar, with a good sized nail driven half through it; draw a piece of slate across the nail.

To operate either of these calls, hold the slate between the thumb and middle finger of the right hand, while the call is held by the thumb and middle finger of the left. Above all things do not make over five strokes for a single call—oftener four. If you exceed this number you will get no turkey, for a turkey can count.

Still another call is made in this wise: Take a piece of dry cedar two inches long and one and a half inches wide and a quarter inch thick, and with a narrow chisel hollow this out so that the sides are about as thin as a piece of tin, or it may be a little thicker, so that it is not too delicate. It should be hollowed out within a quarter of an inch of the bottom and end, and your call is complete. Take both ends between your thumb and fingers and rub it crosswise against the but plate of your gun, or rub it on your gun barrels. You require no rosin or anything else; simply the naked wood as made. In one hour's practice you can perfectly imitate a gobbler or a hen at your pleasure. One beauty about this is, you never make a mis-call or screech; it is perfect every time. Many hunters, however, prefer the old-time hollow bone of the turkey's wing.

Whistle for Calling Bay Snipe. Carefully dry the leg of a curlew, push out the marrow with a red hot knitting needle, plug up one end and then practice.

A Plover Whistle. Take a round miniature tin box three-quarters of an inch in diameter and a quarter of an inch thick, or less, and a small hole exactly through the center. If it does not answer fully on trial, ream out the hole a trifle. We have seen these whistles on sale at toy stores. A little practice will enable you to call any whistling bird.

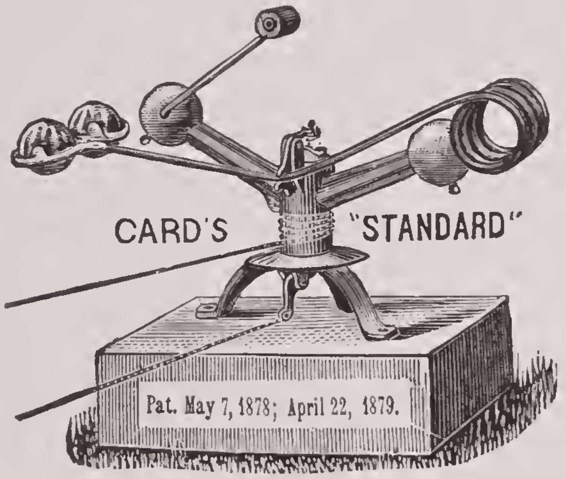


Fig. 19.—*Standard Trap.*

The farmer who has not plenty of wild game on which to practice, may become proficient in marksmanship by a small outlay in the purchase of a trap and balls We give in Fig. 19 an illustration of a trap for this purpose. William H. Cruttenden, of Cazenovia, N. Y., agent. The balls may be either glass or wood. Fig. 20 represents a trap for pigeon practice. It is handy, cheap, durable and sure to work.

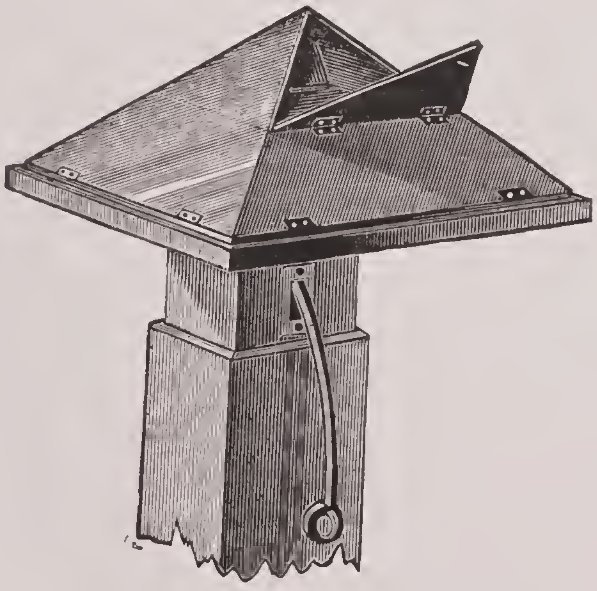


Fig. 20.—*Pigeon Trap.*

Gutter, a small and narrow surface drain; but the word is used in a restricted and technical sense in the practices of irrigation.

Gyp (jip), a name applied by sportsmen to the young female pup.

Gypsum (jip′sum), the hydrous sulphate of lime; land plaster. It consists of 40.1 per cent. of sulphuric acid, 28.5 of lime, and 18 of water, or of three equivalents of sulphuric acid, one of lime, and two of water, or, of one equivalent of sulphate of lime and two of water. It can easily be artificially formed by mixing a solution of muriate of lime with any soluble sulphate, or by pouring sulphuric acid upon common quicklime. In the latter case a violent heat is evolved, and when the mixture is ignited water is given off; and if the sulphuric acid has been in sufficient quantity, the resulting substance is all gypsum; and if not, the substance is partly gypsum and partly quicklime.

History of Gypsum as a Manure. The grand value of gypsum to the farmer, and even the chief interest of it to the merchant, are its uses as a manure. Virgil, in commending the use of ashes to the Roman farmers, speaks of the value of a very impure variety of gypsum; and the early inhabitants of Great Britain and the farmers of Lombardy made use of it in some such way as the Romans But none of these parties were acquainted with its real nature; and even the chemists, till a comparatively late period, were unable to distinguish it from limestone or other calcareous substances. About the middle of the 18th century, a substance which was, long afterward, shown to be an impure gypsum, which had been used as a fertilizer in the neighborhood of Hanover, drew the attention of Mayer, a talented Protestant pastor in the principality of Hohenlohe, and was found by him to possess such manurial powers as promised to be of great and general service to agriculture. He recommended and published the substance by both example and writing, and he speedily made a deep and extensive impression in its favor. Many agriculturists subjected it to experiment, and Schubart in Germany, Tschiffeli in Switzerland, and Franklin in America wrote in recommendation of it, pushed it into notoriety, and both won for it a host of friends and provoked against it a host of foes.

The use of gypsum extended rapidly in various parts of Europe, particularly in the district around Paris, and was so zealously propagated in North America as to occasion exportations from the quarries of Monmouth to the western side of the Atlantic; and gypsum rapidly obtained the fame, in both the old world and the new, as being one of the most powerful auxiliaries of vegetation.

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